RED FREQUENCY

Quartz Crystal Units
Quartz Crystal Oscillators
Ceramic Resonators
SAW Components

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

Contents

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

Contents

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

Quartz Crystal Overview

DIMENTIONS l/w/h in mm (max)	FREQUENCY RANGE	PARTNUMBER
2,0 / 1,2 / 0,6	32,768 KHz	IC 5
3,2 / 1,5 / 0,8	32,768 KHz	IC 6
4,9 / 1,8 / 0,9	32,768 KHz	IC 7
7,0 / 1,5 / 1,4	32,768 KHz	IC 8
8,2 / 3,8 / 2,5	32,768 KHz	IC 9
1,6 / 1,2 / 0,3	26,0 to 80,0 MHz	IC 10
2,1 / 1,7 / 0,5	24,0 to 50,0 MHz	IC 11
2,6 / 2,1 / 0,65	16,0 to 80,0 MHz	IC 12
3,4 / 2,7 / 0,75	10,0 to 125,0 MHz	IC 13
5,0 / 3,2 / 0,7	10,0 to 125,0 MHz	IC 14
5,2 / 3,4 / 1,1	10,0 to 125,0 MHz	IC 15
6,0 / 3,5 / 1,0	8,0 to 125,0 MHz	IC 16
6,2 / 3,7 / 1,2	8,0 to 150,0 MHz	IC 17
7,0 / 5,0 / 1,2	7,37 to 150,0 MHz	IC 18
11,4/ 4,6 / 4,1	3,20 to 70,0 MHz	IC 21
11,4 / 4,6 / 3,3	3,20 to 70,0 MHz	IC 22
10,7/ 4,3 / 3,5	3,20 to 70,0 MHz	IC 23
10,7 / 4,3 / 2,8	3,20 to 70,0 MHz	IC 24
11,0 / 4,6 / 13,5	1,80 to 150,0 MHz	IC 25
8,3 / 3,0	20,0 to 200,0 KHz	IC 26
6,2 / 2,0	20,0 to 200,0 KHz	IC 27
6,0 / 2,0	20,0 to 200,0 KHz	IC 28

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

Oscillators Overview

DIMENTIONS l/w/h in mm (max)	FREQUENCY RANGE	PART NUMBER	POWER SUPPLY	OUTPUT
Quartz Crystal Oscillator				
2,5 / 2,0 / 0,9	2,0 to 50,0 MHz	IO 10	1,8 V/2,5 V/3,3 V	CMOS
2,6 / 2,1 / 1,0	32,768 KHz	IO 11	1,8 V/2,5 V/3,3 V	CMOS
3,2 / 2,5 / 1,2	2,0 to 100,0 MHz	IO 12	1,8 V/2,5 V/3,3 V	CMOS
3,2 / 2,5 / 1,2	32,768 KHz	IO 13	1,8 V/2,5 V/3,3 V	CMOS
5,2 / 3,2 / 1,2	0,5 to 135,0 MHz	IO 14	1,8 V/2,5 V/3,3 V	CMOS
5,2 / 3,2 / 1,2	32,768 KHz	IO 15	3,3 V	CMOS
5,2 / 3,2 / 1,2	0,5 to 135,0 MHz	IO 16	5,0 V	CMOS /TTL
5,2 / 3,2 / 1,2	13,0 to 160,0 MHz	IO 17	2,5 V/3,3 V	CMOS(LOW EMI)
5,2 / 3,2 / 1,2	40,0 to 160,0 MHz	IO 18	2,5 V/3,3 V	L VPECL
7,2 / 5,2 / 1,4	0,5 to 156,0 MHz	IO 19	1,8 V/2,5 V/3,3 V	CMOS/TTL
7,2 / 5,2 / 1,4	32,768 KHz	IO 20	3,3 V	CMOS
7,2 / 5,2 / 1,4	0,5 to 156,0 MHz	IO 21	5,0 V	CMOS /TTL
7,2 / 5,2 / 1,4	13,0 to 160,0 MHz	IO 22	2,5 V/3,3 V	CMOS(LOW EMI)
7,2 / 5,2 / 2,0	25,0 to 800,0 MHz	IO 23	2,5 V/3,3 V	L VPECL
7,2 / 5,2 / 1,4	40,0 to 800,0 MHz	IO 24	2,5 V/3,3 V	LVDS
VCTCXO / TCXO				
5,0 / 3,2 / 1,4	10,0 to 26,0 MHz	IO 26	2,7 V/3,3 V	
7,0 / 5,0 / 2,0	12,0 to 20,0 MHz	IO 27	3,0 V	
VCXO				
5,2 / 3,4 / 1,2	1,0 to 52,0 MHz	IO 28	3,3 V/5,0 V	CMOS
7,2 / 1,2 / 1,8	1,0 to 52,0 MHz	IO 29	3,3 V/5,0 V	CMOS
OCXO				
13,2/ 13,2/ 5,5	0,4 to 200 MHz	IO 30	1,8 V/2,5 V/3,3 V/5,0 V	TTL/CMOS
20,4/ 12,9/ 5,5	0,4 to 200 MHz	IO 31	1,8 V/2,5 V/3,3 V/5,0 V	TTL/CMOS

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

Resonators Overview

DIMENTIONS l/w/h in mm (max)	FREQUENCY RANGE	PART NUMBER
IR ZTA (None Capacitor)		
10,0 / 5,0 / 7,5	1,79 to 8,00 MHz	IR ZTA MG
10,0 / 5,0 / 10,0	6,00 to 13,00 MHz	IR ZTA MT
10,0 / 5,0 / 10,0	12,00 to 60,00 MHz	IR ZTA MX
9,5 / 4,0 / 5,5	1,79 to 6,00 MHz	IRZTAWS
7,4 / 3,4 / 1,8	2,0 to 8,0 MHz	IR ZTA CC MG
4,5 / 2,0 / 1,2	4,0 to 8,0 MHz	IR ZTA CR MG
4,7 / 4,1 / 1,2	6,0 to 13,0 MHz	IR ZTA CS MT
4,7 / 4,1 / 1,2	13,0 to 60,0 MHz	IR ZTA CS MX
3,7 / 3,1 / 1,0	8,0 to 13,0 MHz	IR ZTA CV MT
3,7 / 3,1 / 1,0	16,0 to 60,0 MHz	IR ZTA CV MX
2,5 / 2,0 / 1,2	20,0 to 60,0 MHz	IR ZTA CW MX
IR ZTT (Built–in capacitor)		
9,5 / 4,0 / 5,5	1,79 to 6,00 MHz	IR ZTTWS
7,4 / 3,4 / 1,8	1,8 to 8,00 MHz	IR ZTT CC MG
6,0 / 3,0 /1,6	2,00 to 12,00 MHz	IR ZTTCP
4,5 / 2,0 / 1,2	4,0 to 8,0 MHz	IR ZTT CR MG
4,7 / 4,1 / 1,2	6,0 to 13,0 MHz	IR ZTT CS MT
4,7 / 4,1 / 1,2	13,0 to 60,0 MHz	IR ZTT CS MX
3,7 / 3,1 / 1,0	8,0 to 13,0 MHz	IR ZTT CV MT
3,7 / 3,1 / 1,0	16,0 to 60,0 MHz	IR ZTT CV MX
2,5 / 2,0 / 1,2	20,0 to 60,0 MHz	IR ZTT CW MX

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

SAW Overview

IS SR

SAW Resonator

Dimensions l/w/h in mm (max)	**3,0 x 3,0** **3,8 x 3,8** **5,0 x 5,0** **7,0 x 5,0** **F11 or TO39 or DCC6C**
Center Frequency	**433,92 MHz**

IS RF

RF SAW FILTER

Dimensions l/w/h in mm (max)	3,0 x 3,0 3,8 x 3,8 5,0 x 5,0 7,0 x 5,0 F11 or TO39
Frequency Range	139 ~ 2650 MHz

IS IF

IF SAW FILTER

Dimensions l/w/h in mm (max)	3,0 x 3,0 3,8 x 3,8 5,0 x 5,0 7,0 x 5,0 F11 or TO39
Frequency Range	35.46 MHz ~ 666.667 MHz

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

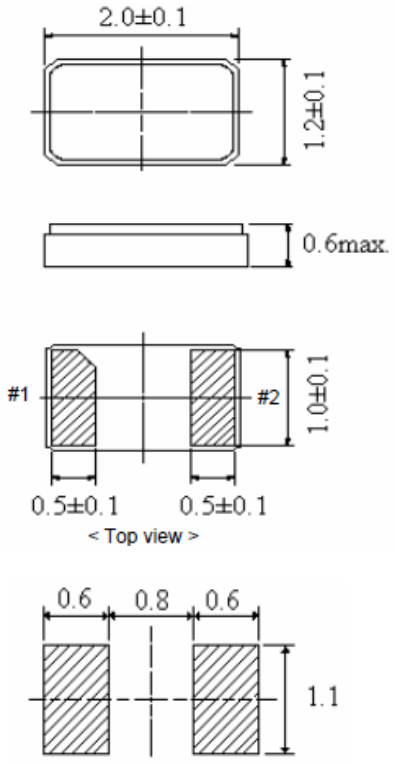
service@intertec-components.de
www.intertec-components.de

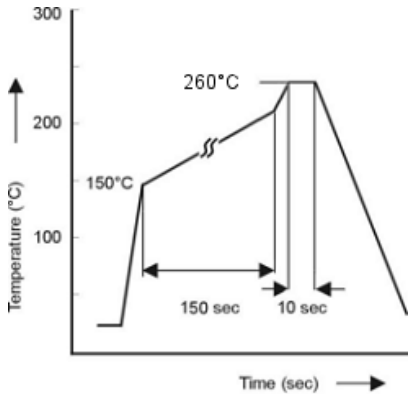
Edition December 2014

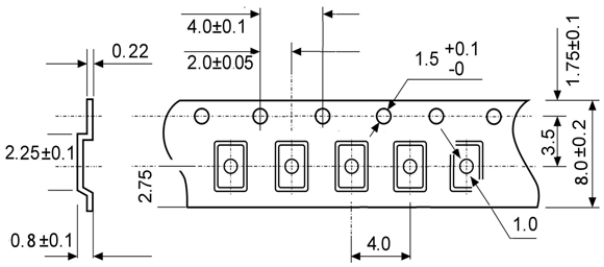
IC 5

Clock Crystal

Dimensions l/w/h in mm (max)	**2,0 x 1,2 x 0,6**
Frequency	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	± 20 ppm (±0,002%)
Frequency Stability at -40°C to +85°C	-0,03 ppm ± 0,01/°C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF ±1,0 pF
Motional Capacitance (C1)	7,0 pF typ.
Shunt Capacitance (C0)	1,3 pF typ.
Series Resonance (R1)	60 KOhm typ., 90 KOhm max.
Drive Level µW max.	0,5 typ.
Aging (df/F) first year at 25°C	± 5 ppm







Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

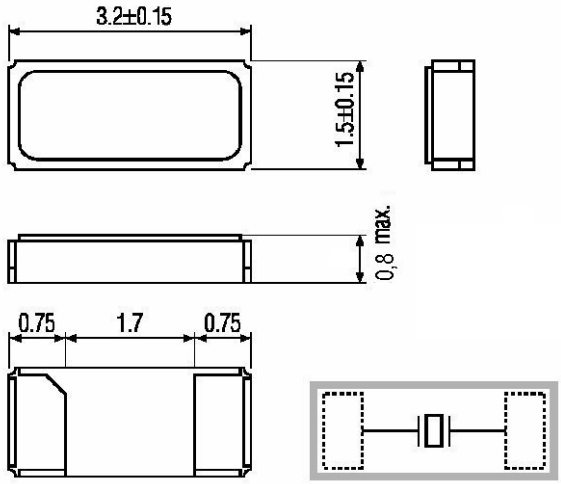
service@intertec-components.de
www.intertec-components.de

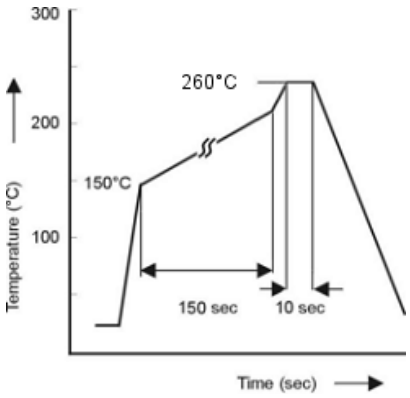
Edition December 2014

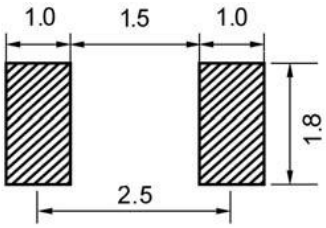
IC 6

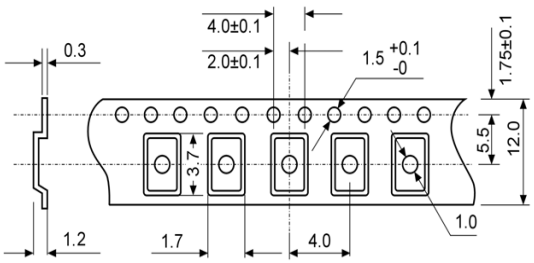
Clock Crystal

Dimensions l/w/h in mm (max)	**3,2 x 1,5 x 0,8**
Frequency	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	± 20 ppm (±0,002%)
Frequency Stability at -40°C to +85°C	-0,034 ppm ± 0,01/°C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF ±1,0 pF
Motional Capacitance (C1)	0,0038 pF typ.
Shunt Capacitance (C0)	1,6 pF typ.
Series Resonance (R1)	80 KOhm max.
Drive Level µW	0,1 typ. 0,5 max
Aging (df/F) first year at 25°C	± 3 ppm









Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

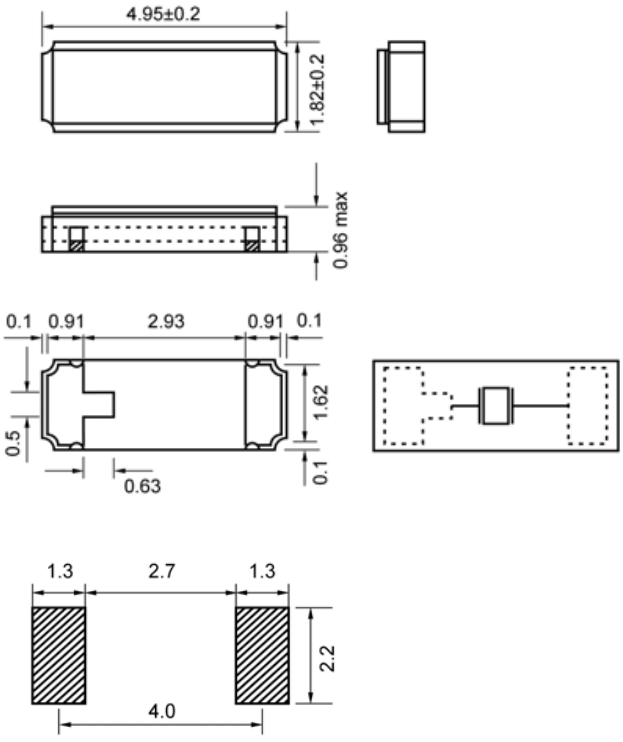
service@intertec-components.de
www.intertec-components.de

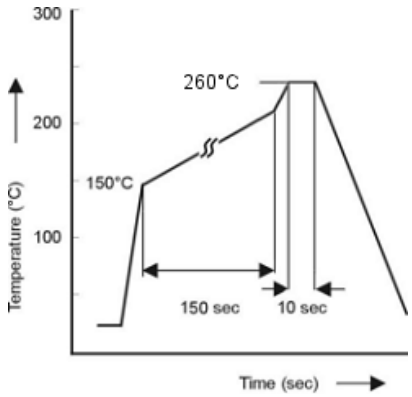
Edition December 2014

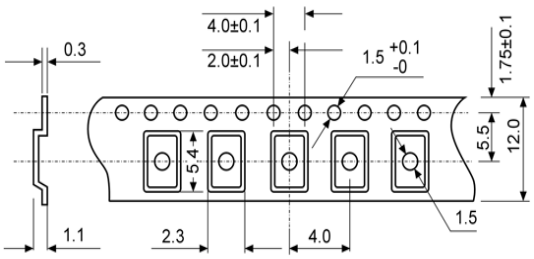
IC 7

Clock Crystal

Dimensions l/w/h in mm (max)	**4,95 x 1,82 x 0,96**
Frequency	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability at -40°C to +85°C	-0,034 ppm ± 0,06/°C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF ±1,0 pF
Shunt Capacitance (C0)	2,0 pF max.
Series Resonance (R1)	80 KOhm typ., 90 KOhm max.
Drive Level µW max.	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 5 ppm







Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

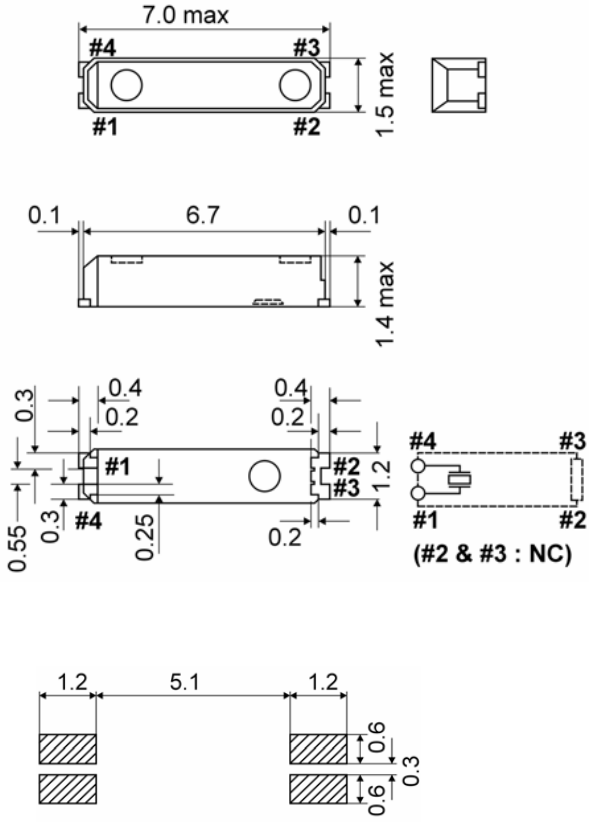
service@intertec-components.de
www.intertec-components.de

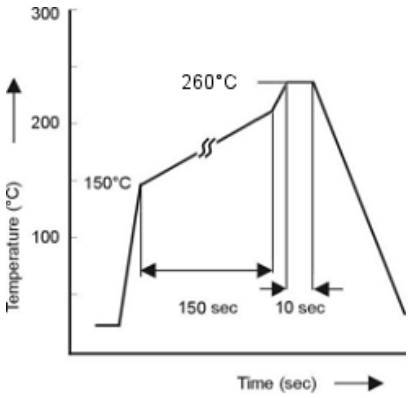
Edition December 2014

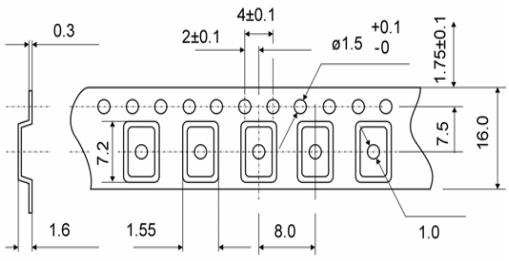
IC 8

Clock Crystal

Dimensions l/w/h in mm (max)	**7,0 x 1,5 x 1,4**
Frequency	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability at -40°C to +85°C	-0,034 ppm ± 0,008/°C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	0,8 pF typ.
Series Resonance (R1)	65 KOhm max.
Drive Level µW	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 3 ppm







Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

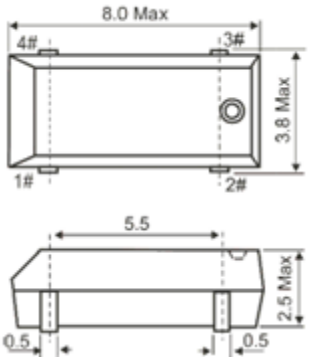
service@intertec-components.de
www.intertec-components.de

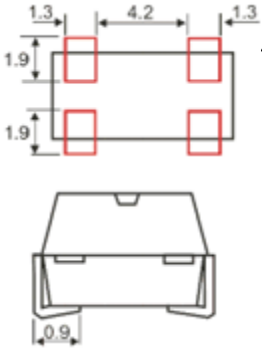
Edition December 2014

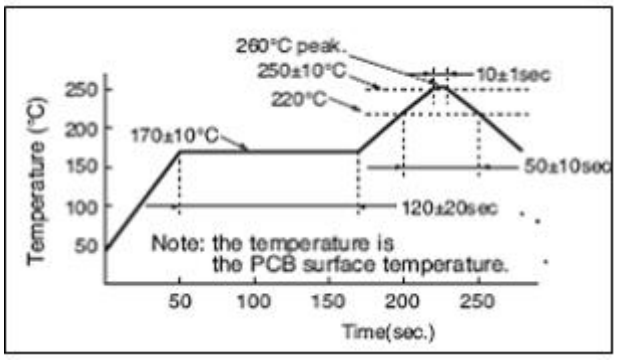
IC 9

Clock Crystal

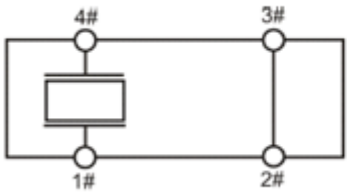
Dimensions l/w/h in mm (max)	**8,0 x 3,8 x 2,5**
Frequency	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	± 20 ppm
Frequency Stability at -40°C to +85°C	-0,034 ppm /°C² typ.± 0,008/°C² max
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	1,55 pF typ.
Series Resonance (R1)	35 KOhm typ., 50K Ohm max.
Drive Level µW max.	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 3 ppm







ELECTRICAL CONNECTIONS



Pin	Connection
1	Input
2	NC
3	NC
4	Output

Remark

1. Do not connect terminals 2#, 3# to external device and GND. These are dummy terminals.
2. The shell of cylinder inside resin mold may be partially exposed; it does not affect the characteristics of crystal unit.

RoHS conf./Pb free

ISO 9001 certified

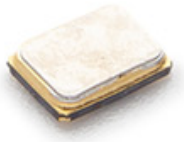
Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

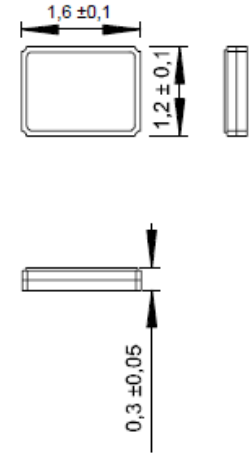
Edition December 2014

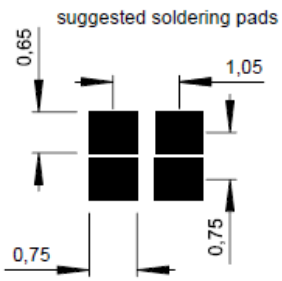
IC 10

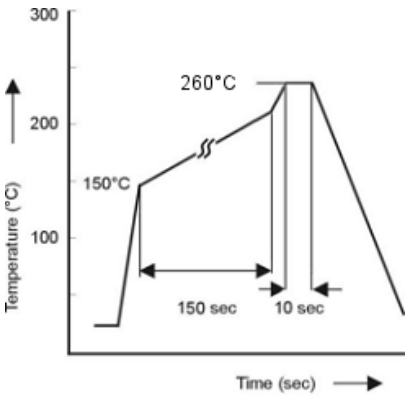


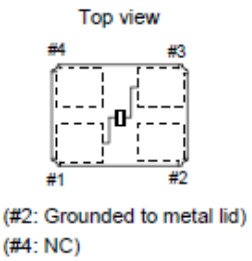
Quartz Crystal Unit

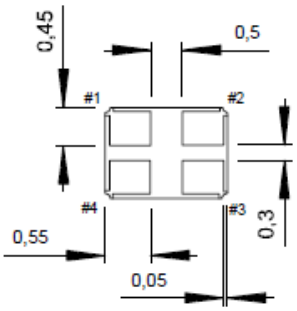
Dimensions l/w/h in mm (max)	**1,6 x 1,2 x 0,3**	
Frequency	26,0 MHz to 80,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	8pF/ 12pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	2,0 pF typ.	
Series Resonance (R1)	26,0 MHz ~ 31,99 MHz	150 Ohm
	32,0 MHz ~ 37,99 MHz	100 Ohm
	38,0 MHz ~ 80,0 MHz	80 Ohm
Drive Level µW max.	200	
Aging (df/F) first year at 25°C	± 3 ppm	

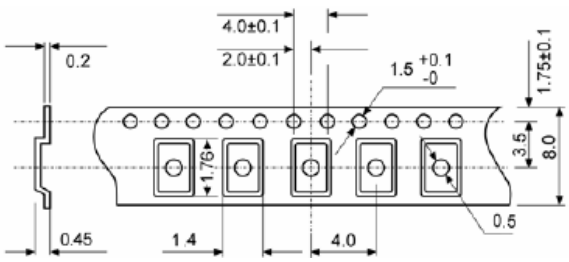












RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

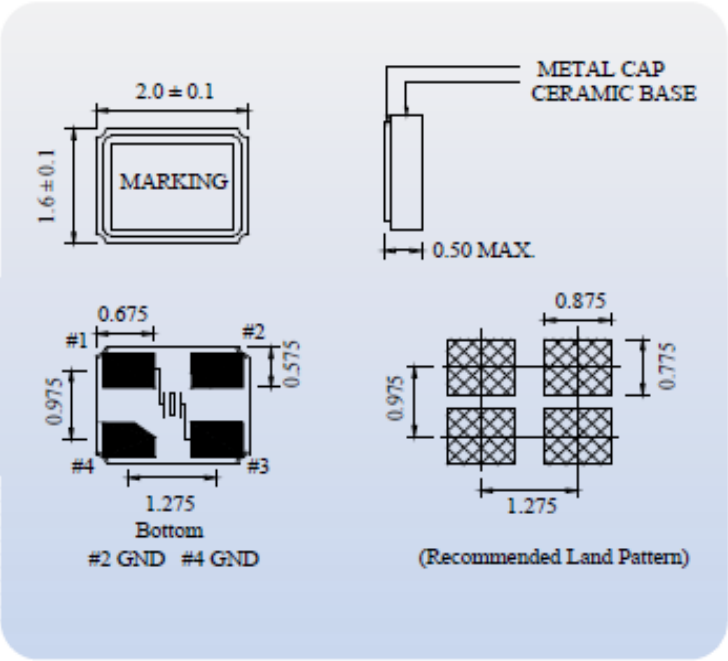
service@intertec-components.de
www.intertec-components.de

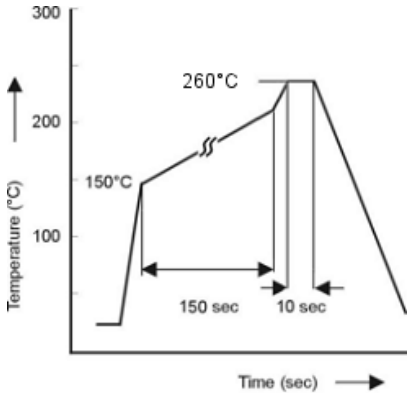
Edition December 2014

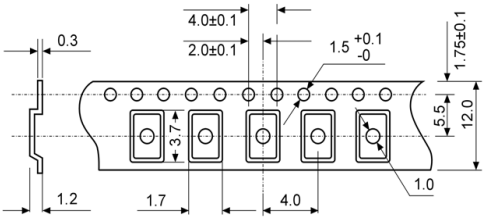
IC 11

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**2,1 x 1,7 x 0,5**	
Frequency	24,0 MHz to 50,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	8pF/ 12pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	2,0 pF typ.	
Series Resonance (R1)	24,0 MHz ~ 29,99 MHz	100 Ohm
	30,0 MHz ~ 37,99 MHz	80 Ohm
	38,0 MHz ~ 50,00 MHz	60 Ohm
Drive Level µW max.	50	
Aging (df/F) first year at 25°C	± 3 ppm	







RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

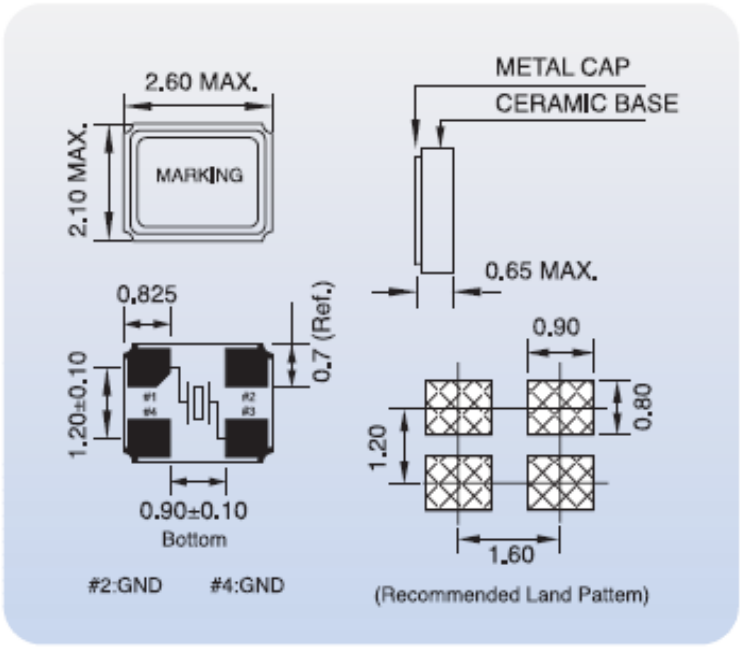
service@intertec-components.de
www.intertec-components.de

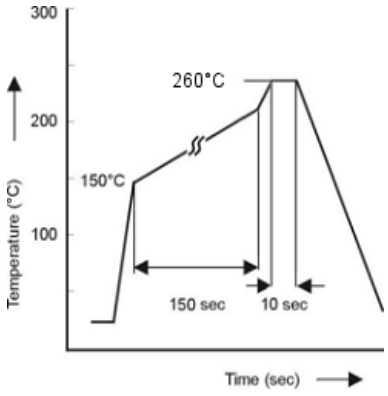
Edition December 2014

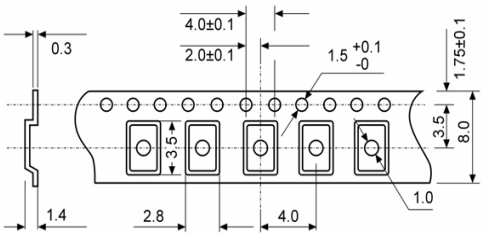
IC 12

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**2,6 x 2,1 x 0,65**
Frequency	16,0 MHz to 80,0 MHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	10pF/ 12pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series
Shunt Capacitance (C0)	5,0 pF max.
Series Resonance (R1)	16,00 MHz ~ 30,00 MHz 100 Ohm 30,10 MHz ~ 80,00 MHz 80 Ohm
Drive Level µW max.	50 max.
Aging (df/F) first year at 25°C	± 3 ppm







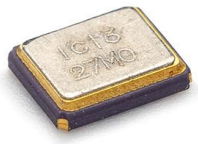
Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

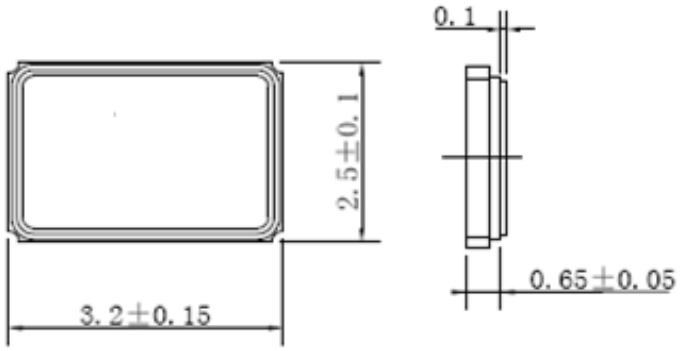
Edition December 2014

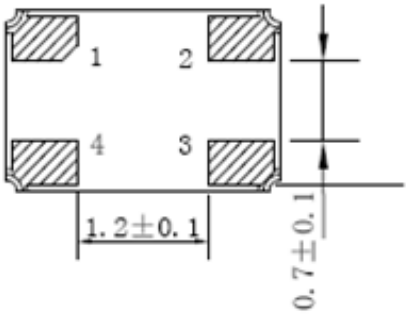
IC 13

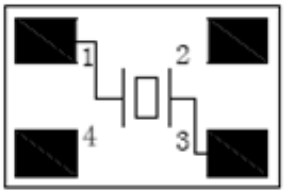


Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**3,4 x 2,7 x 0,75**	
Frequency	10,0 MHz to 125,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	12pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	10,000 MHz ~ 12,0 MHz	100 Ohm
	12,001 MHz ~ 16,0 MHz	80 Ohm
	16,001 MHz ~ 25,0 MHz	60 Ohm
	25,001 MHz ~ 50,0 MHz	40 Ohm
	60,000 MHz ~ 80,0 MHz	80 Ohm (3rd OT)
	80,001 MHz ~ 125,0 MHz	60 Ohm (3rd OT)
Drive Level µW	50 max.	
Aging (df/F) first year at 25°C	± 5 ppm	







Pin	Connection
#1,#3	X'tal
#2,#4	GND

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

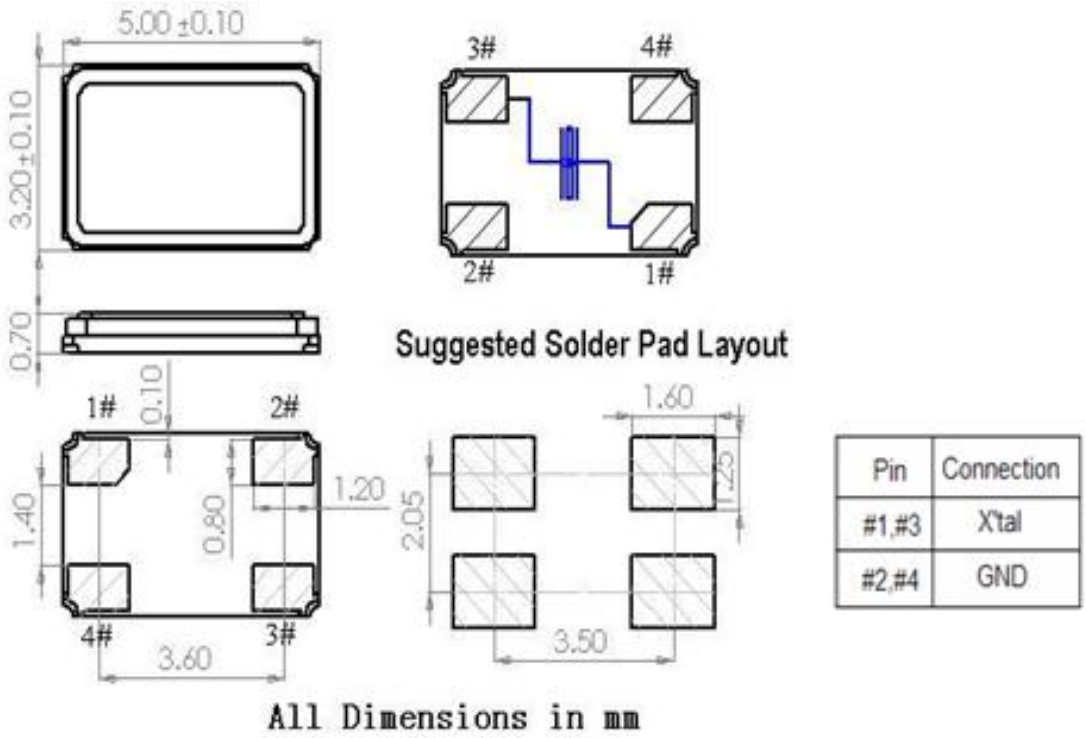
service@intertec-components.de
www.intertec-components.de

Edition December 2014

IC 14

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**5,0 x 3,2 x 0,7**	
Frequency	10,0 MHz to 125,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	12pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	5,0 pF max.	
Series Resonance (R1)	10,000 MHz ~ 12,0 MHz	100 Ohm
	12,001 MHz ~ 16,0 MHz	80 Ohm
	16,001 MHz ~ 25,0 MHz	60 Ohm
	25,001 MHz ~ 50,0 MHz	40 Ohm
	60,000 MHz ~ 80,0 MHz	80 Ohm (3rd OT)
	80,001 MHz ~ 125,0 MHz	80 Ohm (5th OT)
Drive Level µW	50 max.	
Aging (df/F) first year at 25°C	± 3 ppm	



RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

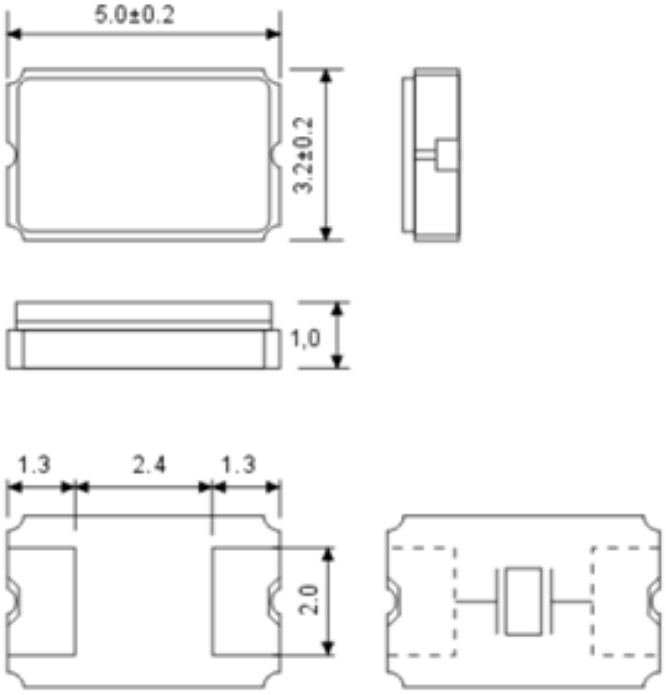
service@intertec-components.de
www.intertec-components.de

Edition December 2014

IC 15

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**5,2 x 3,4 x 1,0**	
Frequency	10,0 MHz to 125,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	12pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	10,000 MHz ~ 12,0 MHz	100 Ohm
	12,001 MHz ~ 16,0 MHz	80 Ohm
	16,001 MHz ~ 25,0 MHz	60 Ohm
	25,001 MHz ~ 50,0 MHz	40 Ohm
	60,000 MHz ~ 80,0 MHz	80 Ohm (3rd OT)
	80,001 MHz ~ 125,0 MHz	60 Ohm (5th OT)
Drive Level µW	50 max.	
Aging (df/F) first year at 25°C	± 3 ppm	



RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

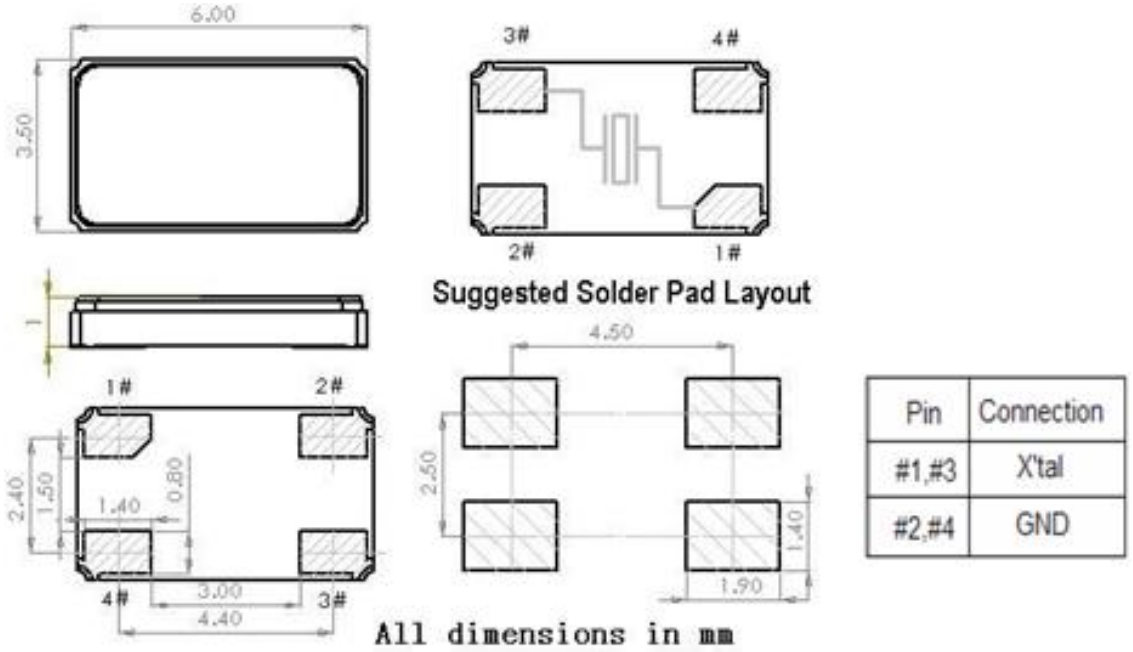
service@intertec-components.de
www.intertec-components.de

Edition December 2014

IC 16

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**6,0 x 3,5 x 1,0**	
Frequency	8,0 MHz to 125,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	8,000 MHz ~ 10,0 MHz	80 Ohm
	10,000 MHz ~ 12,0 MHz	60 Ohm
	12,001 MHz ~ 50,0 MHz	40 Ohm
	48,000 MHz ~ 60,0 MHz	80 Ohm (3rd OT)
	60,001 MHz ~ 125,0 MHz	60 Ohm (3rd OT)
Drive Level µW	50 max.	
Aging (df/F) first year at 25°C	± 3 ppm	



Pin	Connection
#1,#3	X'tal
#2,#4	GND

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

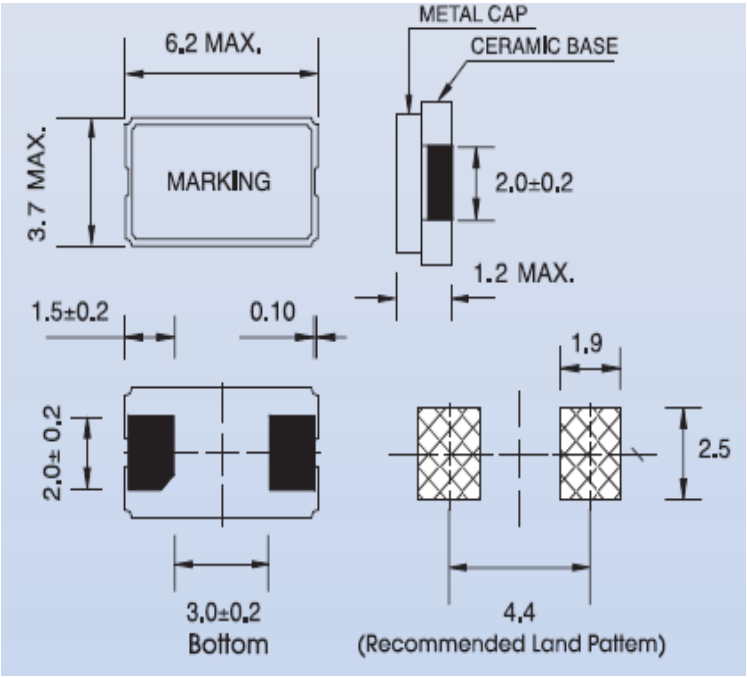
service@intertec-components.de
www.intertec-components.de

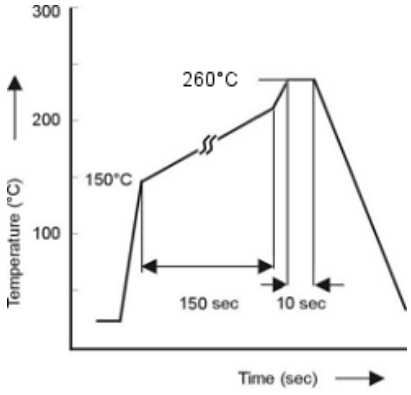
Edition December 2014

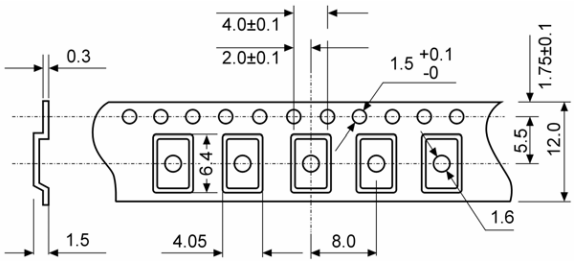
IC 17

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**6,2 x 3,7 x 1,2**	
Frequency	8,0 MHz to 150,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	5,0 pF max.	
Series Resonance (R1)	8,000 MHz ~ 12,0 MHz	80 Ohm
	12,001 MHz ~ 80,0 MHz	50 Ohm
	80,001 MHz ~ 150,0 MHz	100 Ohm (3rd OT)
Drive Level µW max.	100 max.	
Aging (df/F) first year at 25°C	± 2 ppm	







Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

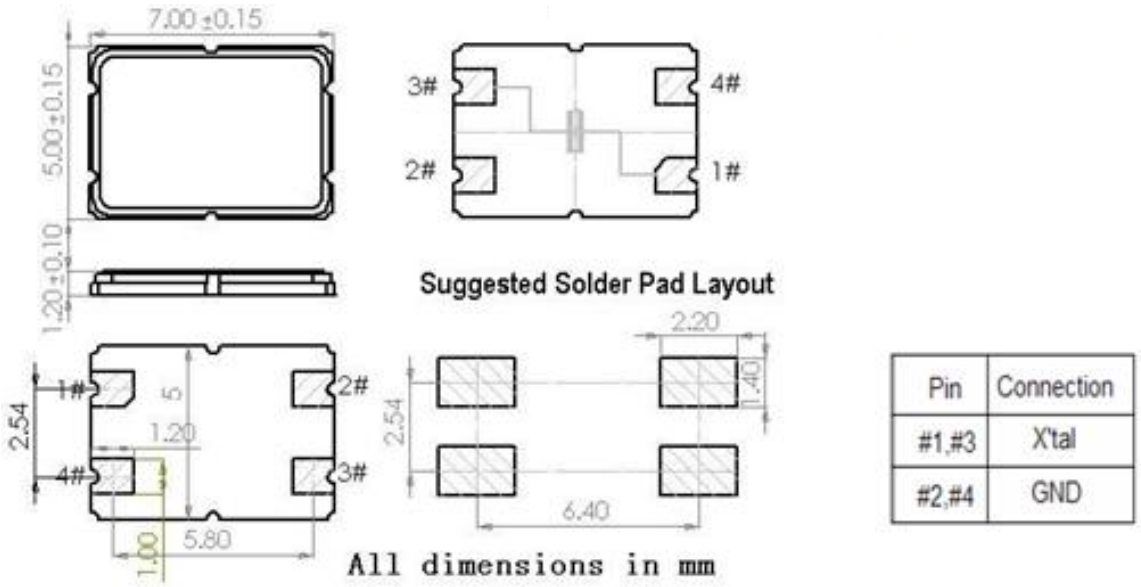
service@intertec-components.de
www.intertec-components.de

Edition December 2014

IC 18

Quartz Crystal Unit

Dimensions l/w/h in mm (max)	**7,0 x 5,0 x 1,2**	
Frequency	7,3728 MHz to 150,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	7,3728 MHz ~ 8,0 MHz	80 Ohm
	8,001 MHz ~ 12,0 MHz	60 Ohm
	12,001 MHz ~ 20,0 MHz	40 Ohm
	20,001 MHz ~ 50,0 MHz	30 Ohm
	36,000 MHz ~ 50,0 MHz	80 Ohm (3rd OT)
	50,001 MHz ~ 125,0 MHz	60 Ohm (3rd OT)
	100,000 MHz ~ 150,0 MHz	120 Ohm (5th OT)
Drive Level µW	50 max.	
Aging (df/F) first year at 25°C	± 3 ppm	



Pin	Connection
#1,#3	X'tal
#2,#4	GND

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

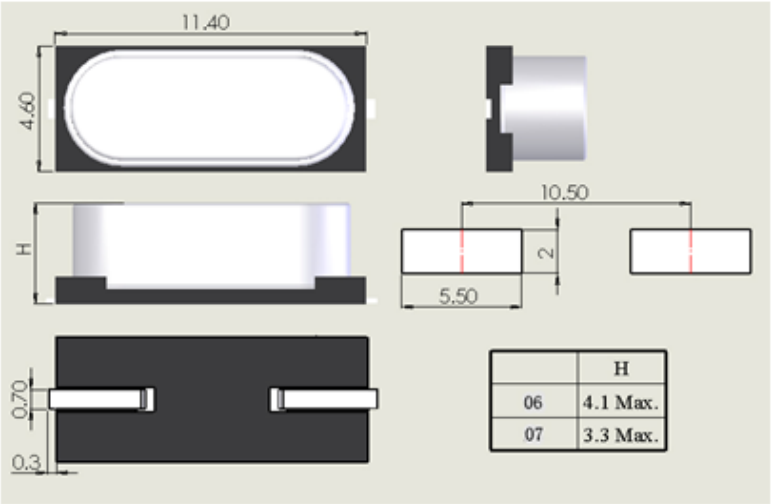
service@intertec-components.de
www.intertec-components.de

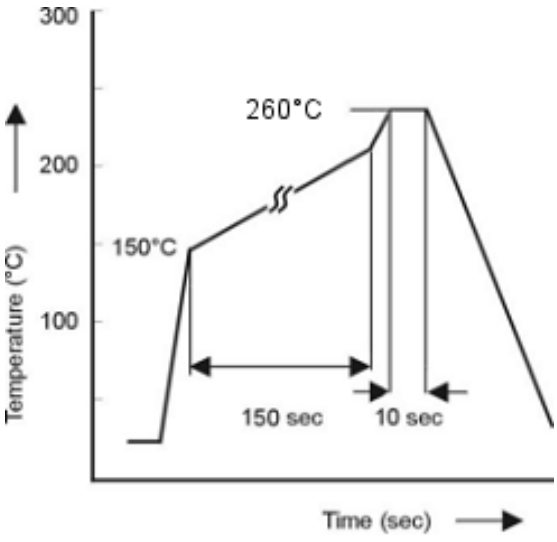
Edition December 2014

IC 21

Quartz Crystal Unit
HC 49 US

Dimensions l/w/H in mm (max)	**11,4 x 4,6 x 4,1**	
Frequency	3,20 MHz to 70,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	3,2 MHz ~ 4,99 MHz	150 Ohm
	5,0 MHz ~ 6,99 MHz	100 Ohm
	7,0 MHz ~ 8,99 MHz	80 Ohm
	9,0 MHz ~ 12,99 MHz	60 Ohm
	13,0 MHz ~ 19,99 MHz	40 Ohm
	20,0 MHz ~ 33,0 MHz	30 Ohm
	27,0 MHz ~ 70,0 MHz	100 Ohm (3rd OT)
Drive Level µW	100 max.	
Aging (df/F) first year at 25°C	± 3 ppm	





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

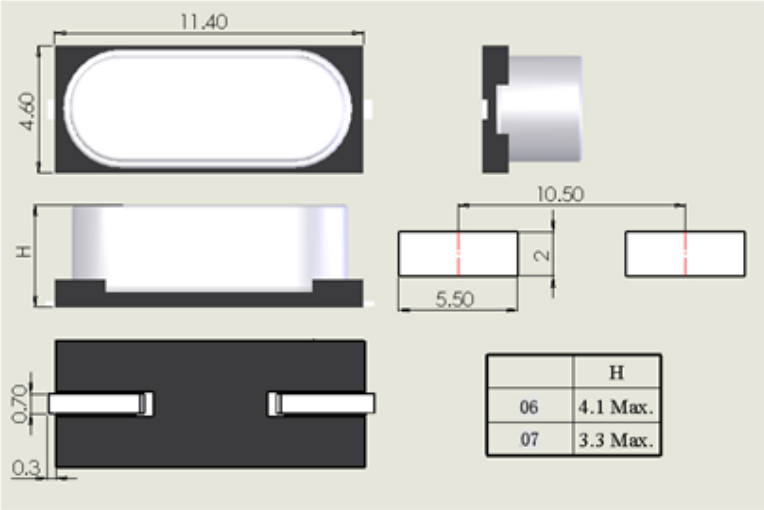
service@intertec-components.de
www.intertec-components.de

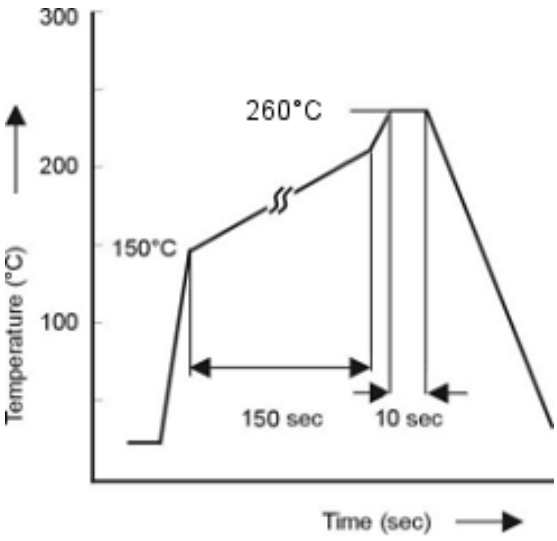
Edition December 2014

IC 22

Quartz Crystal Unit
HC 49 US

Dimensions l/w/H in mm (max)	**11,4 x 4,6 x 3,3**	
Frequency	3,20 MHz to 70,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	3,2 MHz ~ 4,99 MHz	150 Ohm
	5,0 MHz ~ 6,99 MHz	100 Ohm
	7,0 MHz ~ 8,99 MHz	80 Ohm
	9,0 MHz ~ 12,99 MHz	60 Ohm
	13,0 MHz ~ 19,99 MHz	40 Ohm
	20,0 MHz ~ 33,0 MHz	30 Ohm
	27,0 MHz ~ 70,0 MHz	100 Ohm (3rd OT)
Drive Level µW	100 max.	
Aging (df/F) first year at 25°C	± 3 ppm	





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

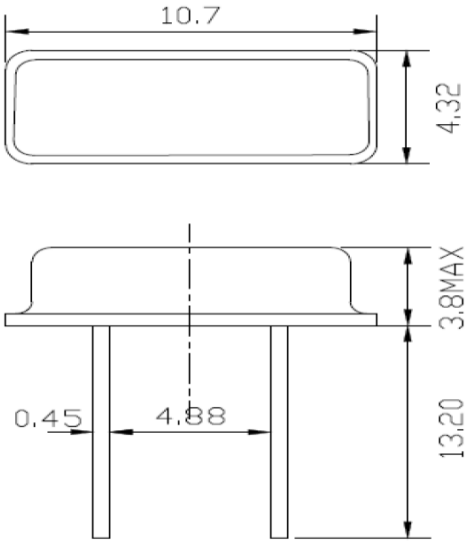
service@intertec-components.de
www.intertec-components.de

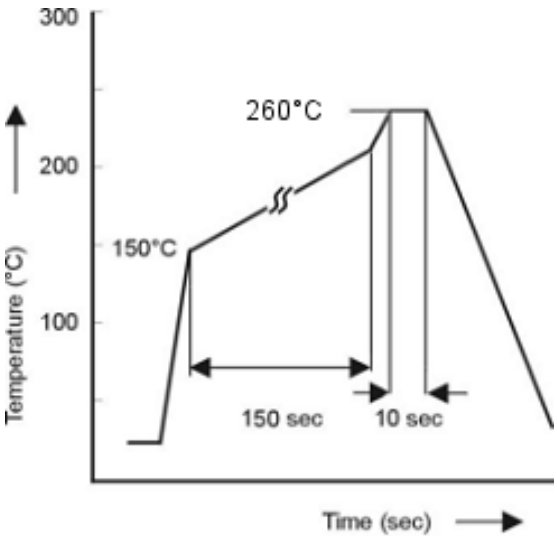
Edition December 2014

IC 23

Quartz Crystal Unit
HC 49 US Thru-Hole

Dimensions l/w/h in mm (max)	10,7 x 4,3 x 3,5	
Frequency	3,20 MHz to 70,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	3,2 MHz ~ 4,99 MHz	150 Ohm
	5,0 MHz ~ 6,99 MHz	100 Ohm
	7,0 MHz ~ 8,99 MHz	80 Ohm
	9,0 MHz ~ 12,99 MHz	60 Ohm
	13,0 MHz ~ 19,99 MHz	40 Ohm
	20,0 MHz ~ 33,0 MHz	30 Ohm
	27,0 MHz ~ 70,0 MHz	100 Ohm (3rd OT)
Drive Level µW	100 max	
Aging (df/F) first year at 25°C	± 3 ppm	





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

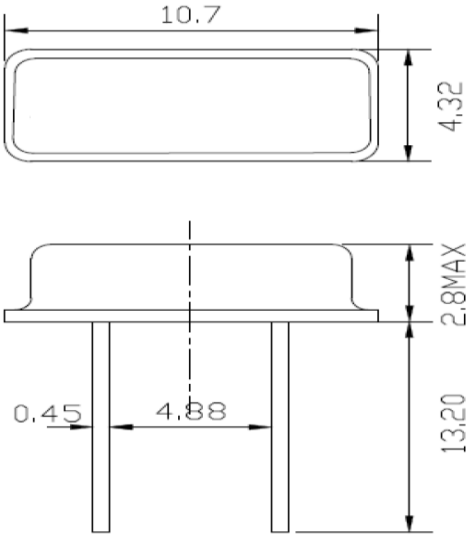
service@intertec-components.de
www.intertec-components.de

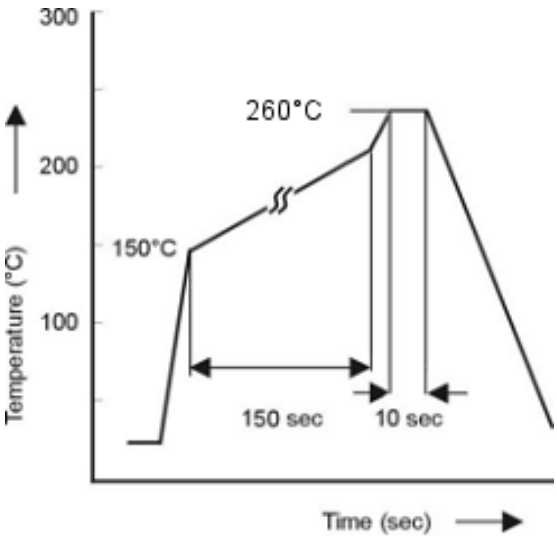
Edition December 2014

IC 24

Quartz Crystal Unit
HC 49US Thru-Hole Ultra Low

Dimensions l/w/h in mm (max)	10,7 x 4,3 x 2,8	
Frequency	3,20 MHz to 70,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Tolerance at 25°C	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series	
Shunt Capacitance (C0)	7,0 pF max.	
Series Resonance (R1)	3,2 MHz ~ 4,99 MHz	150 Ohm
	5,0 MHz ~ 6,99 MHz	100 Ohm
	7,0 MHz ~ 8,99 MHz	80 Ohm
	9,0 MHz ~ 12,99 MHz	60 Ohm
	13,0 MHz ~ 19,99 MHz	40 Ohm
	20,0 MHz ~ 33,0 MHz	30 Ohm
	27,0 MHz ~ 70,0 MHZ	100 Ohm (3rd OT)
Drive Level µW	100 max	
Aging (df/F) first year at 25°C	± 3 ppm	





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

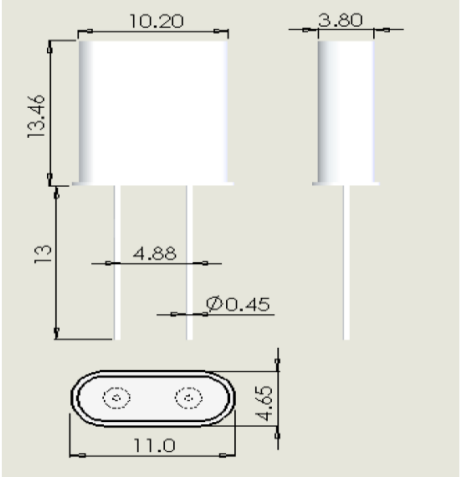
Edition December 2014

RED FREQUENCY

IC 25

Quartz Crystal Unit
HC 49U Thru-Hole

Dimensions l/w/h in mm (max)	**11,0 x 4,6 x 13,5**
Frequency	1,80 MHz to 150,0 MHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16pF/ 18pF/ 20pF/ 30pF/ 32pF or series
Shunt Capacitance (C0)	7,0 pF max.
Series Resonance (R1)	1,80 MHz ~ 1,999 MHz 750 Ohm 2,00 MHz ~ 2,399 MHz 500 Ohm 2,40 MHz ~ 3,1999 MHz 300 Ohm 3,20 MHz ~ 4,199 MHz 100 Ohm 4,20 MHz ~ 4,899 MHz 70 Ohm 4,90 MHz ~ 5,999 MHz 50 Ohm 6,00 MHz ~ 9,999 MHz 40 Ohm 10,00 MHz ~ 15,999 MHz 30 Ohm 16,00 MHz ~ 35,000 MHz 20 Ohm 20,00 MHz ~ 24,999 MHz 60 Ohm (3rd OT) 25,00 MHz ~ 100,00 MHz 40 Ohm (3rd OT) 60,00 MHz ~ 79,999 MHz 80 Ohm (5th OT) 80,00 MHz ~ 150,00 MHz 60 Ohm (5th OT)
Drive Level µW	100 max
Aging (df/F) first year at 25°C	± 3 ppm



RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

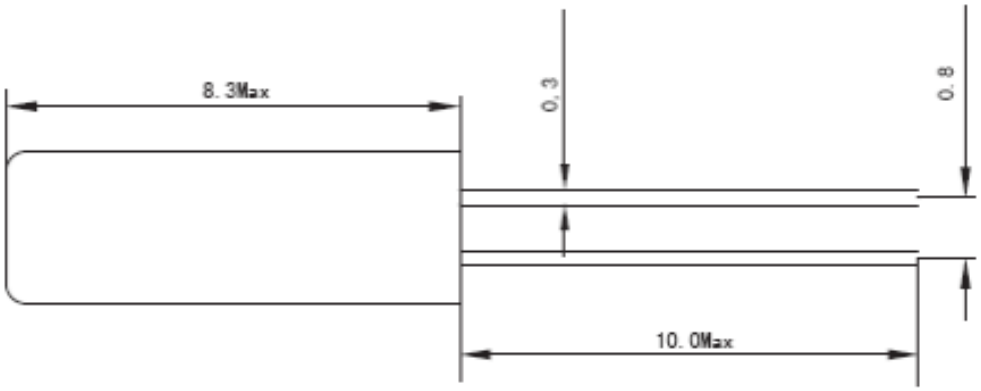
service@intertec-components.de
www.intertec-components.de

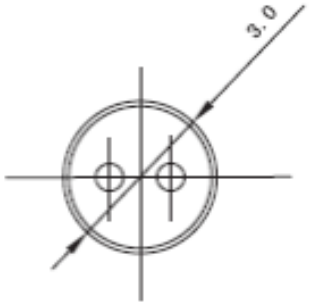
Edition December 2014

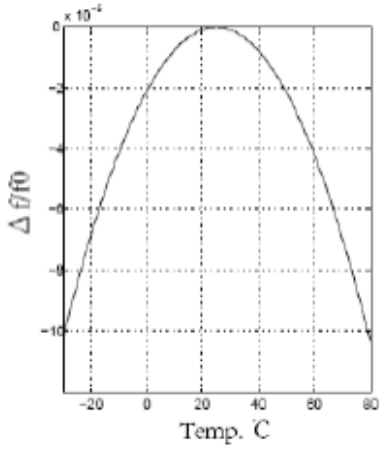
IC 26

Quartz Crystal Unit
KHz Range Thru-Hole

Dimensions l/d in mm (max)	**8,3 x 3,0**
Frequency	20,0 KHz to 200,0 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability over Temperature	-0.034 ppm / °C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series
Shunt Capacitance (C0)	1,25 pF typ.
Series Resonance (R1)	35 KOhm (Typ.) / 50 KOhm (Max.)
Drive Level µW max.	1,0 max.
Aging (df/F) first year at 25°C	± 3 ppm







RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

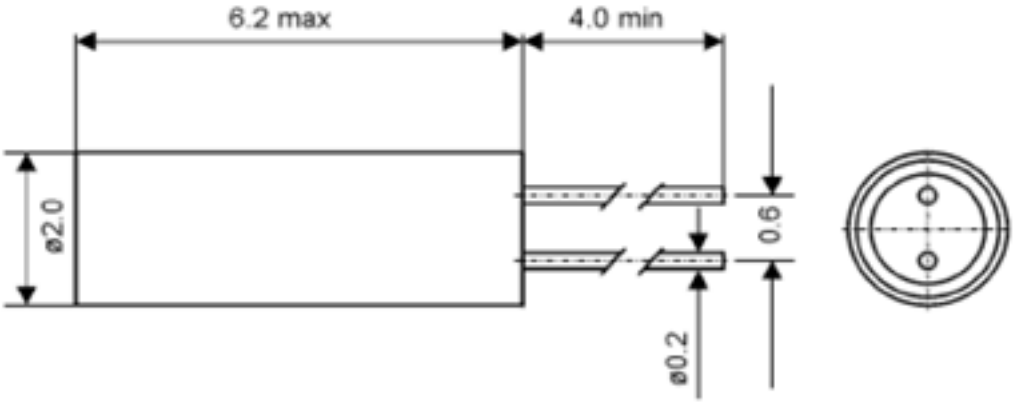
service@intertec-components.de
www.intertec-components.de

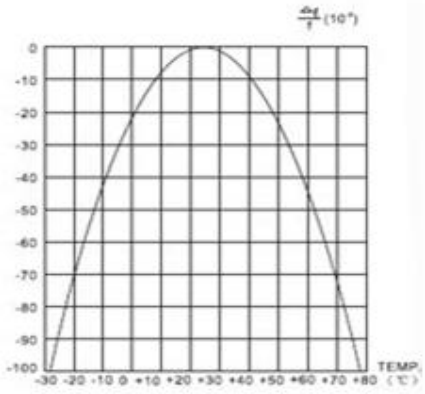
Edition December 2014

IC 27

Quartz Crystal Unit
KHz Range Thru-Hole

Dimensions l/d in mm (max)	**6,2 x 2,0**
Frequency	20,0 KHz to 200,0 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability over Temperature	-0.034 ppm / °C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series
Shunt Capacitance (C0)	1,25 pF typ.
Series Resonance (R1)	35 KOhm (Typ.) / 50 KOhm (Max.)
Drive Level µW max.	1,0 max.
Aging (df/F) first year at 25°C	± 3 ppm





Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

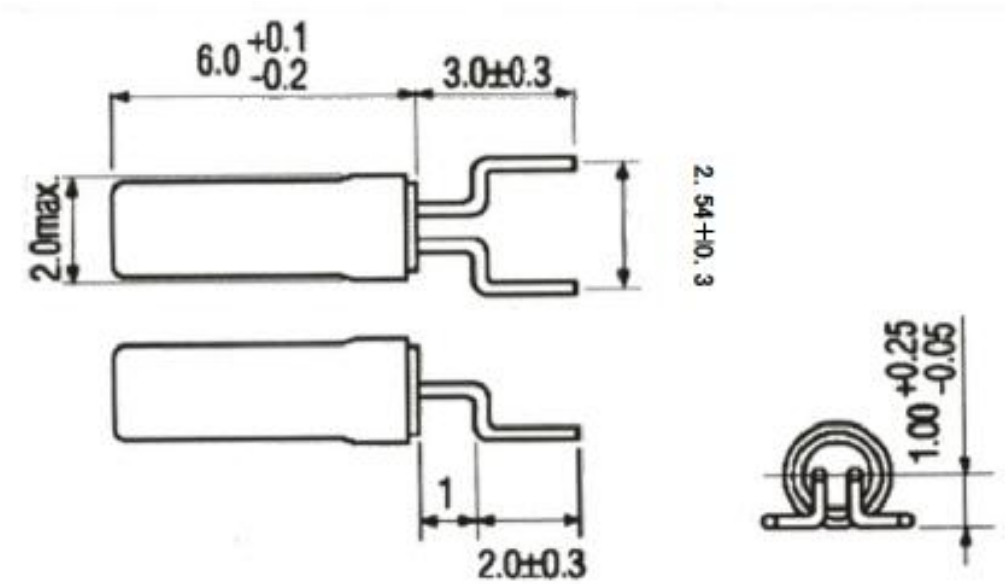
service@intertec-components.de
www.intertec-components.de

Edition December 2014

IC 28

Quartz Crystal Unit
KHz Range SMD

Dimensions l/d in mm (max)	6,0 x 2,0
Frequency	20,0 KHz to 200,0 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Tolerance at 25°C	Refer to Ordering Guidance
Frequency Stability over Temperature	-0.042 ppm / °C² typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5pF/ 16pF/ 18pF/ 20pF/ 30pF/ 32pF or series
Shunt Capacitance (C0)	1,8 pF typ.
Series Resonance (R1)	35 KOhm (Typ.) / 50 KOhm (Max.)
Drive Level µW max.	1,0 max.
Aging (df/F) first year at 25°C	± 3 ppm



Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

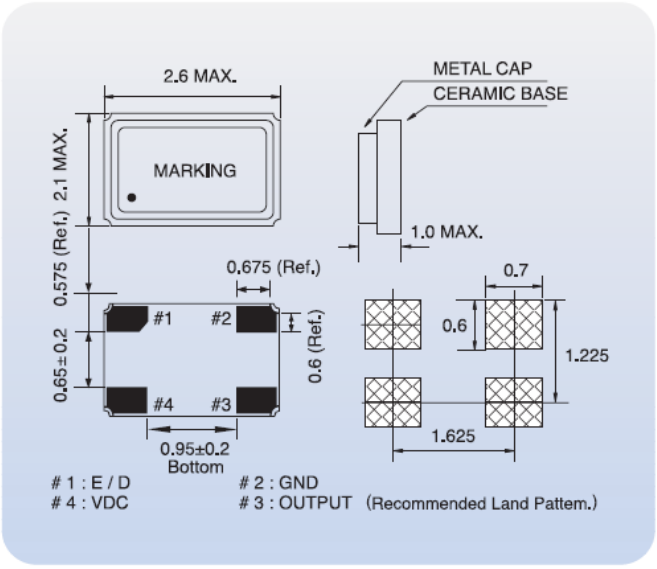
service@intertec-components.de
www.intertec-components.de

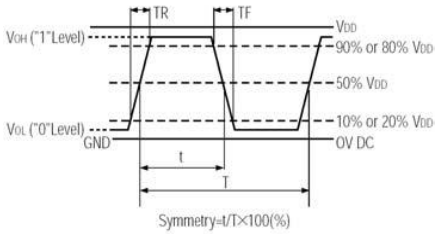
Edition December 2014

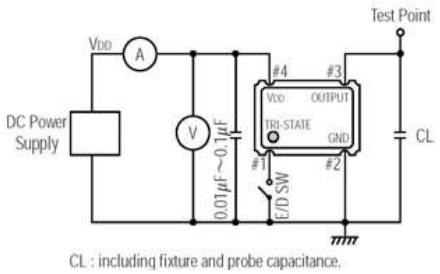
IO 10

Clock Oscillator 2,5 V

Dimensions l/w/h (max)	**2,6 mm x 2,1 mm x 1,0 mm**	
Frequency range	2,0 MHz to 50,0 MHz	
Operating Temperature	Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance	
Power supply voltage	2,5 V	
Storage Temperature	-55°C to +125°C	
Output level	CMOS	
Output symmetry	40-60% (45-55% avail.) at 50%VDD	
Rise & Fall Time	1,99 MHz to 19,99 MHz	7 nS
	20,0 MHz to 50,0 MHz	6 nS
Input current max.	1,0 MHz to 1,99 MHz	6 mA
	10,0 MHz to 31,99 MHz	8 mA
	32,0 MHz to 50,0 MHz	20 mA
Output load	15pF	
Standby current	50 µA	
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max	
Aging	±2 ppm	







Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

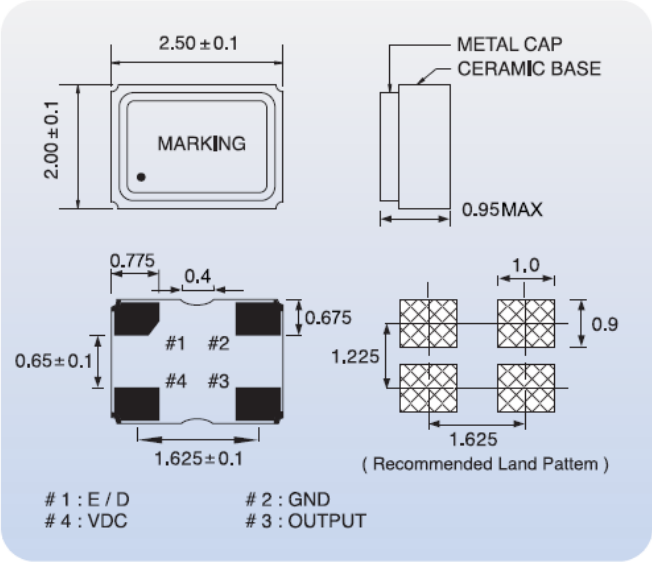
service@intertec-components.de
www.intertec-components.de

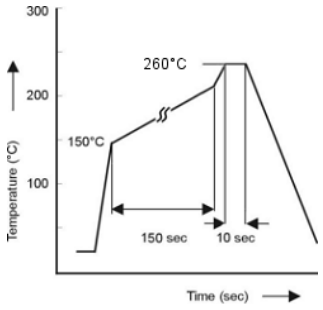
Edition December 2014

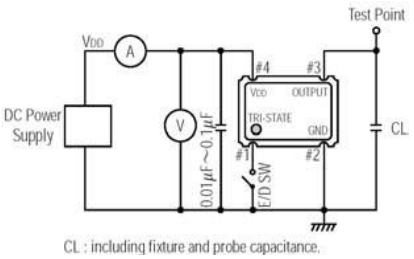
IO 11

Clock Oscillator 1,8 V/2,5 V/3,3 V 32,768 KHz

Dimensions l/w/h (max)	**2,6 mm x 2,1 mm x 0,95 mm**		
Frequency	32,768 KHz		
Operating Temperature	Refer to Ordering Guidance		
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance		
Rise & Fall time	50 nS		
Storage Temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	40-60% (45-55% avail.) at 50%VDD		
Power supply voltage	1,8 V	2,5 V	3,3 V
Input current	1,5 mA	2,5 mA	3,5 mA
Standby current	50 µA		
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max		
Aging	±3 ppm		







Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

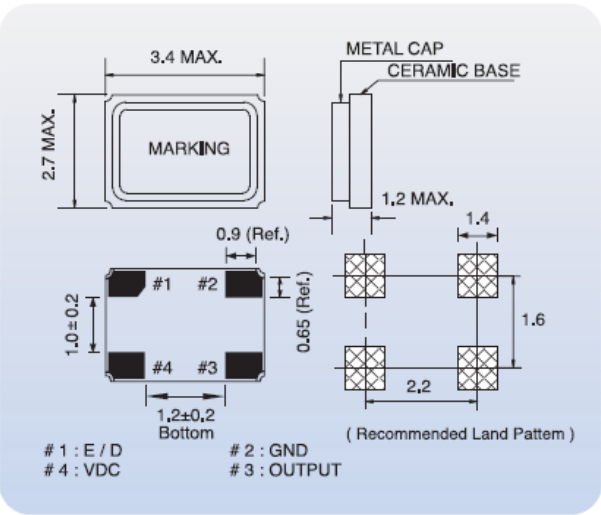
Edition December 2014

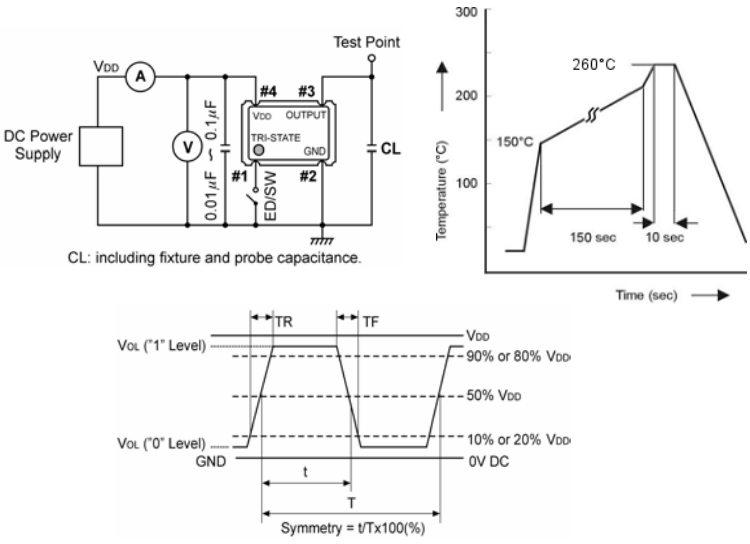
RED FREQUENCY

IO 12

Clock Oscillator 1,8 V/2,5 V/3,3 V/ 5,0 V

Dimensions l/w/h (max)		**3,4 mm x 2,7 mm x 1,2 mm**				
Frequency range		0,5 MHz to 135,0 MHz				
Operating Temperature		Refer to Ordering Guidance				
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance				
Storage Temperature		-55°C to +125°C				
Output level		CMOS				
Output symmetry		45-55% (40-60% avail.) at 50%VDD				
Power supply voltage		1,8 V	2,5 V	3,3 V	5,0 V	±10%
Input current	0,50 MHz ~ 9,99 MHz	3 mA	3 mA	5 mA	7 mA	
	10,0 MHz ~ 19,99 MHz	5 mA	5 mA	10 mA	15 mA	
	20,0 MHz ~ 49,99 MHz	10 mA	15 mA	20 mA	30 mA	
	50,0 MHz ~ 79,99 MHz	15 mA	20 mA	25 mA	40 mA	
	80,0 MHz ~ 135,00 MHz	20 mA	25 mA	40 mA	60 mA	
Rise & Fall time	0,50 MHz ~ 4,99 MHz	10 nS	8 nS	6 nS	5 nS	
	5,00 MHz ~ 19,99 MHz	8 nS	6 nS	5 nS	4 nS	
	20,0 MHz ~ 49,99 MHz	6 nS	5 nS	5 nS	4 nS	
	50,0 MHz ~ 79,99 MHz	5 nS	5 nS	4 nS	3 nS	
	80,0 MHz ~ 135,00 MHz	5 nS	4 ns	3 nS	2 nS	
Standby current		10 µA				
Tristate controlvoltage		VIH: VDD x 0,7min VIL: VDD x 0,3 max				
Aging		±3 ppm				





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

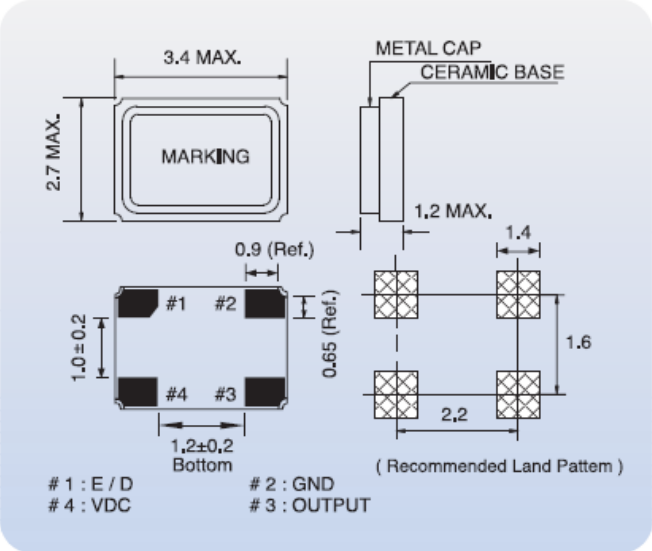
Edition December 2014

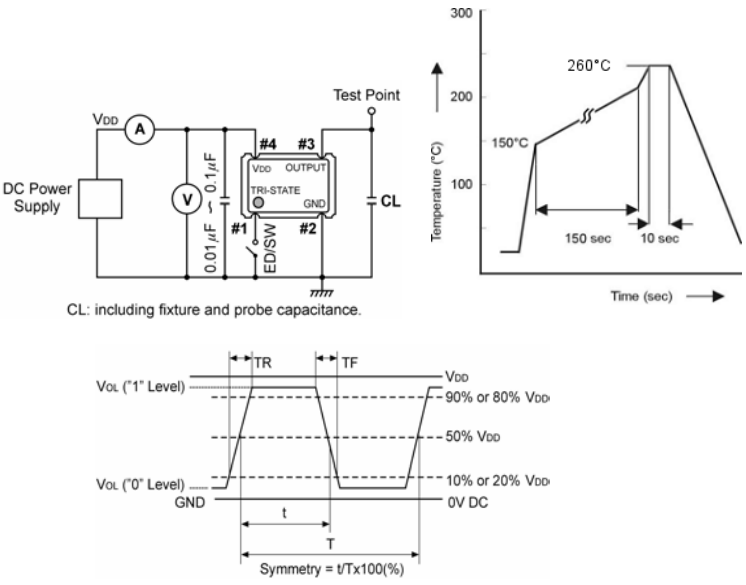
RED FREQUENCY

IO 13

Clock Oscillator 1,8 V/ 2,5 V/ 3,3 V
32,768 KHz

Dimensions l/w/h (max)	**3,4 mm x 2,7 mm x 1,2 mm**		
Frequency range	32,768 KHz		
Operating Temperature	Refer to Ordering Guidance		
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance		
Rise & Fall time	300 nS		
Storage Temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	45-55% (40-60% avail.) at 50%VDD		
Power supply voltage	1,8 V	2,5 V	3,3 V
Input current	1,5 mA	2,5 mA	3,5 mA
Standby current	50 µA		
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max		
Aging	±3 ppm		





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

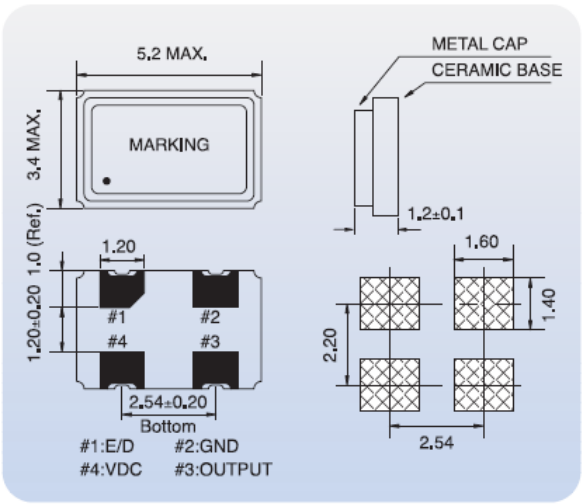
service@intertec-components.de
www.intertec-components.de

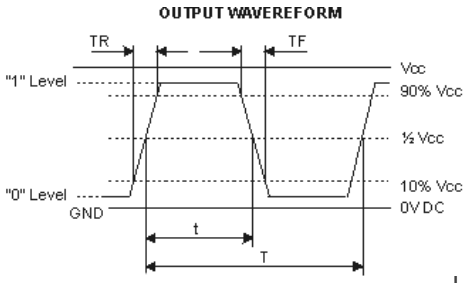
Edition December 2014

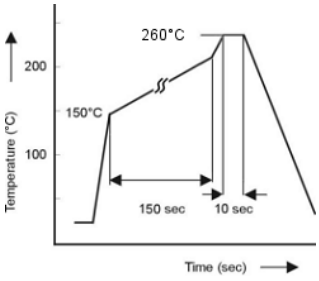
IO 14

Clock Oscillator 1,8 V/ 2,5 V/ 3,3 V

Dimensions l/w/h (max)		**5,2 mm x 3,4 mm x 1,2 mm**			
Frequency range		0,5 MHz to 135,0 MHz			
Operating Temperature		Refer to Ordering Guidance			
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance			
Storage Temperature		-55°C to +125°C			
Output level		CMOS			
Output symmetry		45-55% (40-60% avail.) ±10% at 50%VDD			
Power supply voltage		1,8 V	2,5 V	3,3 V	±10%
Input current	0,50 MHz ~ 9,99 MHz	3 mA	3 mA	5 mA	
	10,0 MHz ~ 19,99 MHz	5 mA	5 mA	10 mA	
	20,0 MHz ~ 49,99 MHz	10 mA	15 mA	20 mA	
	50,0 MHz ~ 79,99 MHz	15 mA	20 mA	25 mA	
	80,0 MHz ~ 135,00 MHz	20 mA	25 mA	40 mA	
Rise & Fall time	0,50 MHz ~ 4,99 MHz	10 nS	8 nS	6 nS	
	5,00 MHz ~ 19,99 MHz	8 nS	6 nS	5 nS	
	20,0 MHz ~ 49,99 MHz	6 nS	5 nS	5 nS	
	50,0 MHz ~ 79,99 MHz	5 nS	5 nS	4 nS	
	80,0 MHz ~ 135,00 MHz	5 nS	4 ns	3 nS	
Output load		15 pF			
Standby current		10 µA max.			
Tristate		Yes			
Aging		±3 ppm			







RoHS conf./Pb free

ISO 9001 certified

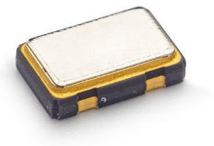
Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

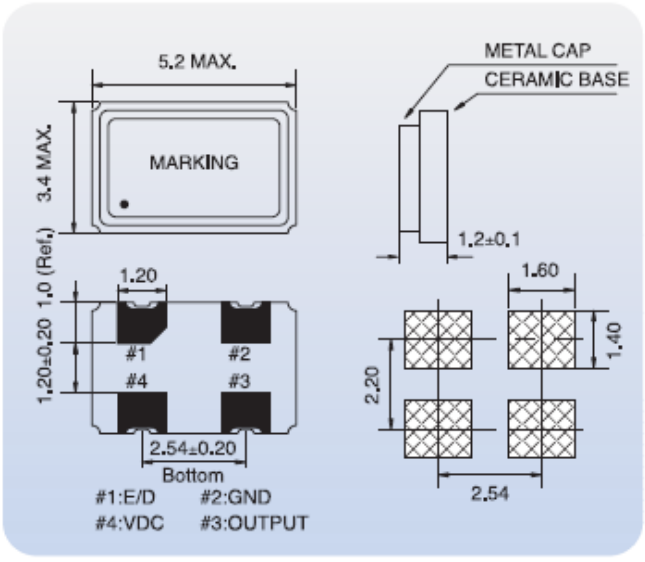
Edition December 2014

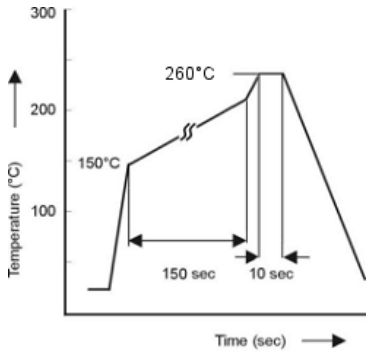
IO 15

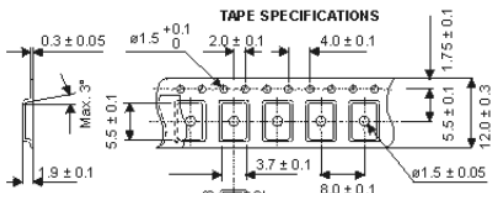


Clock Oscillator 3,3 V
32,768 KHz

Dimensions l/w/h (max)	**5,2 mm x 3,4 mm x 1,2 mm**
Frequency range	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance
Power supply voltage	3,3 V ±10%
Storage Temperature	-55°C to +125°C
Output level	CMOS
Output symmetry	40-60% (45-55% avail.) ±10% at 50%VDD
Rise & Fall Time	200 nS
Input current max.	1,0 mA
Output load	15 pF
Standby current	10 µA max.
Tristate	Yes
Aging	±3 ppm







RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

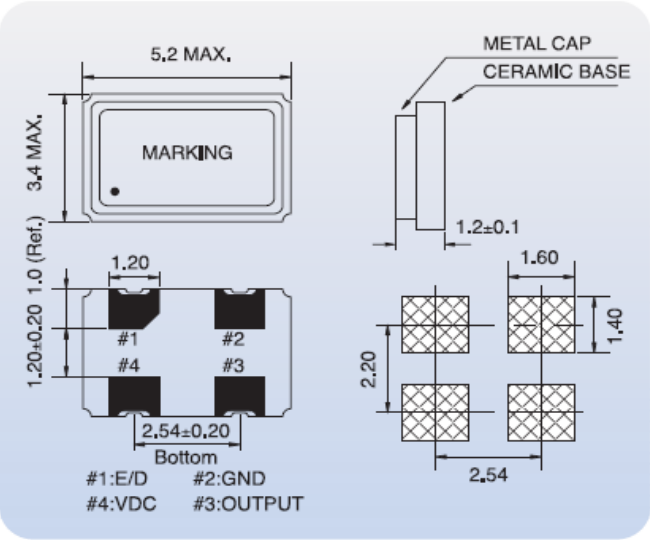
service@intertec-components.de
www.intertec-components.de

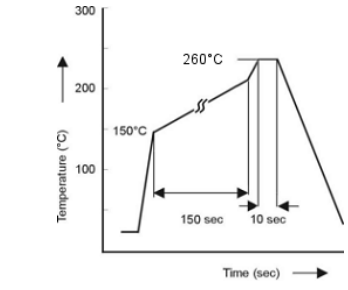
Edition December 2014

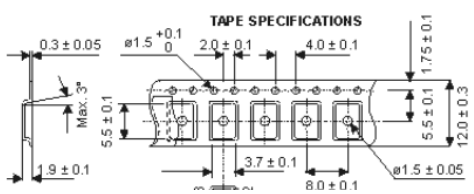
IO 16

Clock Oscillator 5,0 V

Dimensions l/w/h (max)		**5,2 mm x 3,4 mm x 1,2 mm**
Frequency range		0,5 MHz to 135,0 MHz
Operating Temperature		Refer to Ordering Guidance
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance
Storage Temperature		-55°C to +125°C
Output level		CMOS TTL
Output symmetry		45-55% (40-60% avail.) ±10% at 50%VDD
Power supply voltage		5,0 V ±10%
Input current	0,50 MHz ~ 9,99 MHz	7 mA
	10,0 MHz ~ 19,99 MHz	15 mA
	20,0 MHz ~ 49,99 MHz	30 mA
	50,0 MHz ~ 79,99 MHz	40 mA
	80,0 MHz ~ 135,00 MHz	60 mA
Rise & Fall time	0,50 MHz ~ 4,99 MHz	5 nS
	5,00 MHz ~ 19,99 MHz	4 nS
	20,0 MHz ~ 49,99 MHz	4 nS
	50,0 MHz ~ 79,99 MHz	3 nS
	80,0 MHz ~ 135,00 MHz	2 nS
Tristate		Yes
Output load		15 pF
Aging		±3 ppm







RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

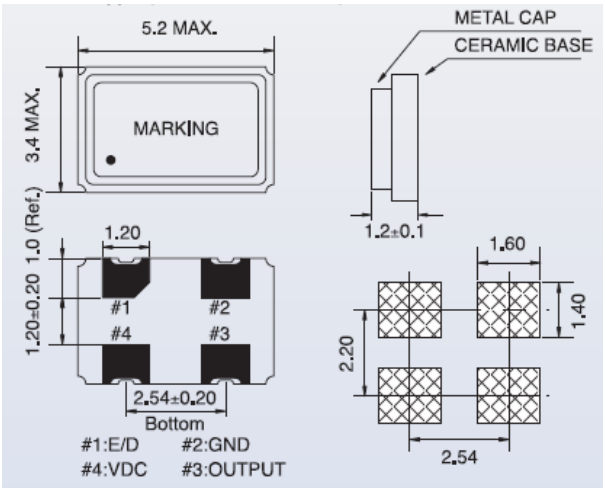
service@intertec-components.de
www.intertec-components.de

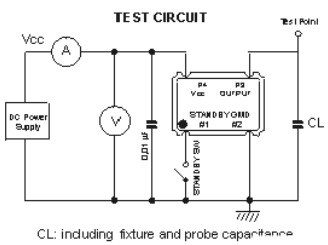
Edition December 2014

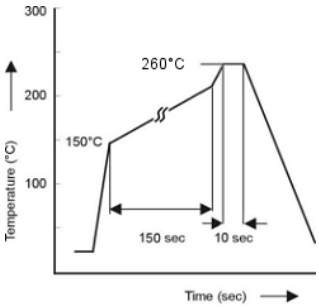
IO 17

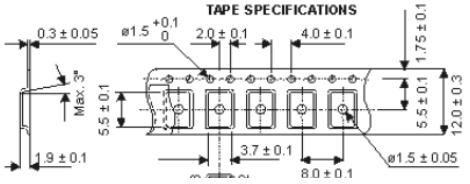
Clock Oscillator 2,5 V/3,3 V
LOW EMI

Dimensions l/w/h (max)		**5,2 mm x 3,4 mm x 1,3 mm**	
Frequency range		13,0 MHz to 160,0 MHz	
Operating temperature		Refer to Ordering Guidance	
Frequency stability in Operating Temp. Range		Refer to Ordering Guidance	
Storage temperature		-55°C to +125°C	
Output level		CMOS	
Output symmetry		40-60% at 50%VDD	
Power supply voltage		2,5 V±10%	3,3 V±10%
Rise & Fall Time	13,0 MHz -49,99 MHz	5 nS	10nS
	50,0 MHz -79,99 MHz	4 nS	8nS
	80,0 MHz -99,99 MHz	3 nS	5nS
	100,0 MHz -160 MHz	3 nS	4nS
Input current	13,0 MHz -49,99 MHZ	20 mA	20 mA
	50,0 MHz -79,99 MHz	20 mA	25 mA
	80,0 MHz -91,99 MHz	25 mA	30 mA
	100,0 MHz -160,0 MHz	30 mA	40 mA
Output load		15 pF	
Tristate		yes	
Aging		±3 ppm	









RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

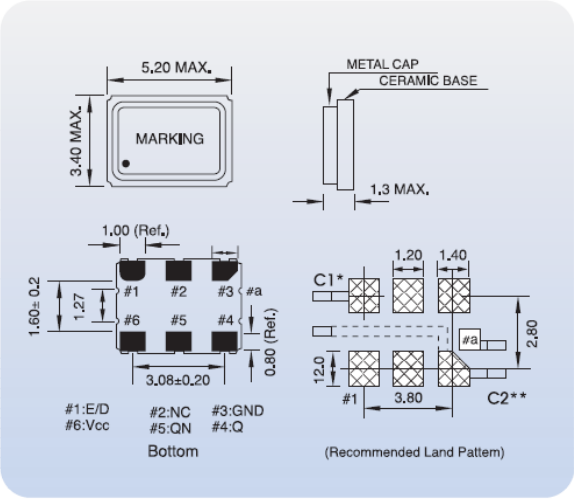
service@intertec-components.de
www.intertec-components.de

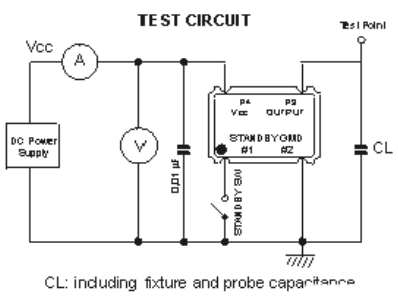
Edition December 2014

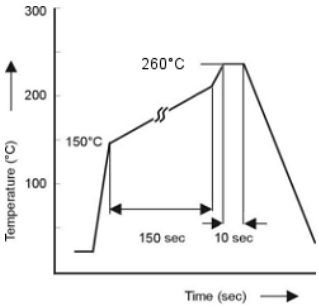
IO 18

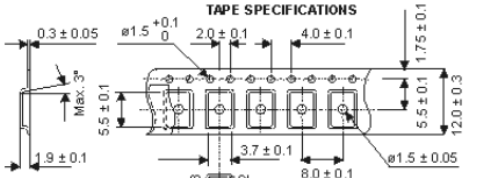
Clock Oscillator 2,5 V/3,3 V LVPECL

Dimensions l/w/h (max)		**5,2 mm x 3,4 mm x 1,3 mm**	
Frequency range		40,0 MHz to 160,0 MHz	
Operating temperature		Refer to Ordering Guidance	
Frequency stability in Operating Temp. Range		Refer to Ordering Guidance	
Storage temperature		-55°C to +125°C	
Output load		50 Ohm	
Output symmetry		45-55% at 50%VDD	
Power supply voltage		2,5 V ±5%	3,3 V ±10%
Rise & Fall Time 20%/80%	40,0 MHz -100,99 MHz	1,0 nS	1,0 nS
	101,0 MHz -160,00 MHz	0,5 nS	0,5 nS
Input current max.	25,0 MHz -100,99 MHz	60 mA	60 mA
	101,0 MHz -160,00 MHz	65 mA	65 mA
Output Voltage High (VOH)		1,475 Vmin	2,275 Vmin
Output Voltage Low (VOL)		1,095 Vmax	1,680 Vmax
Enable High Input Voltage		1,75 Vmin	2,31 Vmin
Tristate		Yes	
Enable Low Input Voltage		0,72 Vmax	0,99 Vmax
Aging		±3 ppm	









RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

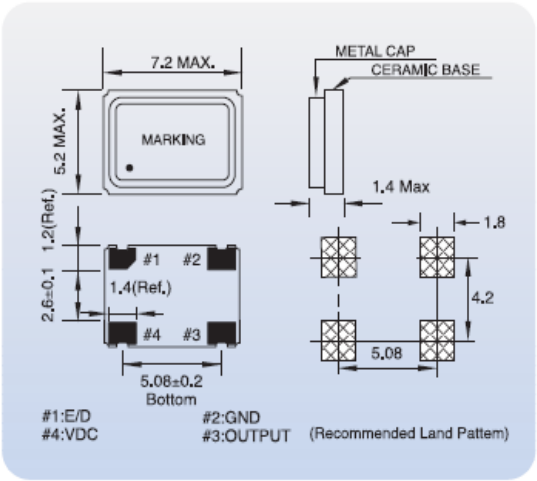
service@intertec-components.de
www.intertec-components.de

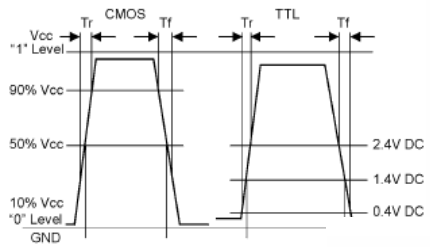
Edition December 2014

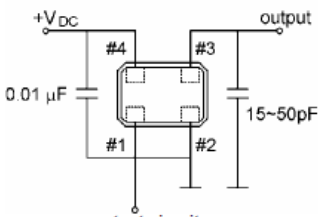
IO 19

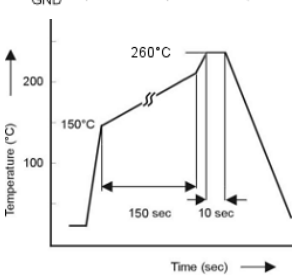
Clock Oscillator 1,8 V/2,5 V/3,3 V

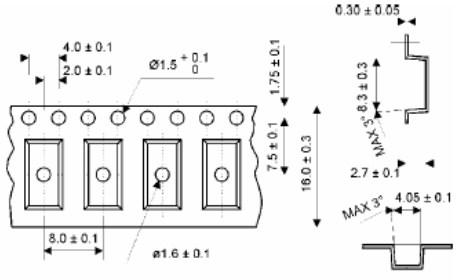
Dimensions l/w/h (max)		**7,2 mm x 5,2 mm x 1,4 mm**			
Frequency range		0,5 MHz to 135,0 MHz			
Operating Temperature		Refer to Ordering Guidance			
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance			
Storage Temperature		-55°C to +125°C			
Output level		CMOS/TTL			
Output symmetry		45-55% (40-60% avail.) ±10% at 50%VDD			
Power supply voltage		1,8 V	2,5 V	3,3 V	±10%
Input current	0,50 MHz ~ 9,99 MHz	3 mA	3 mA	5 mA	
	10,0 MHz ~ 19,99 MHz	5 mA	5 mA	10 mA	
	20,0 MHz ~ 49,99 MHz	10 mA	15 mA	20 mA	
	50,0 MHz ~ 79,99 MHz	15 mA	20 mA	25 mA	
	80,0 MHz ~ 135,00 MHz	20 mA	25 mA	40 mA	
Rise & Fall time	0,50 MHz ~ 4,99 MHz	10 nS	8 nS	6 nS	
	5,00 MHz ~ 19,99 MHz	8 nS	6 nS	5 nS	
	20,0 MHz ~ 49,99 MHz	6 nS	5 nS	5 nS	
	50,0 MHz ~ 79,99 MHz	5 nS	5 nS	4 nS	
	80,0 MHz ~ 135,00 MHz	5 nS	4 ns	3 nS	
Tristate		Yes			
Output load		15 pF			
Standby current		10 µA max.			
Aging		±3 ppm			











RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

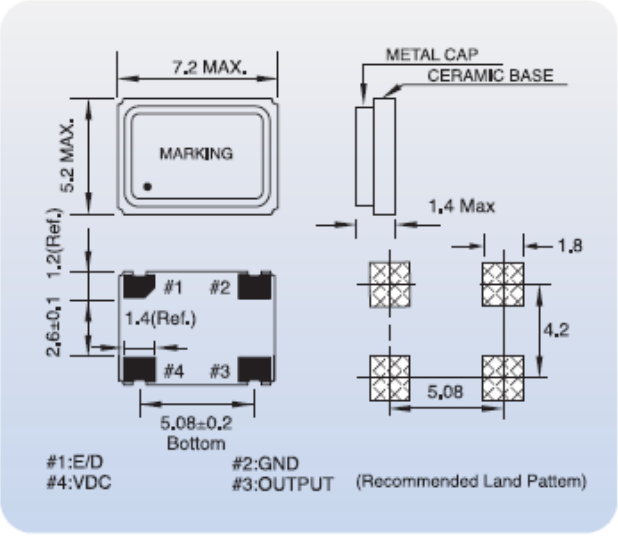
service@intertec-components.de
www.intertec-components.de

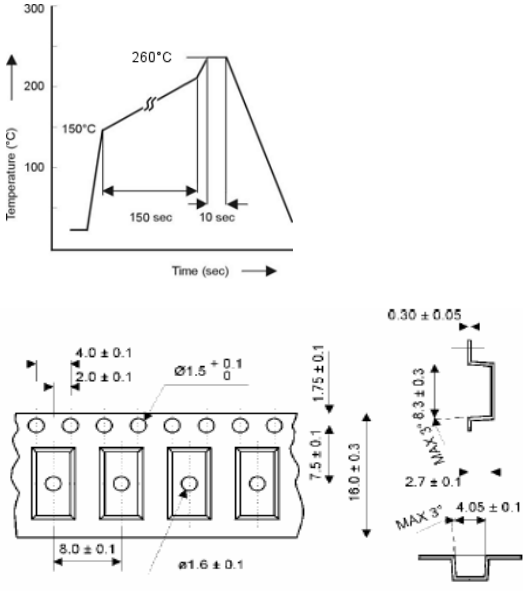
Edition December 2014

IO 20

Clock Oscillator 3,3 V
32,768 KHz

Dimensions l/w/h (max)	**7,2 mm x 5,2 mm x 1,4 mm**
Frequency range	32,768 KHz
Operating Temperature	Refer to Ordering Guidance
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance
Power supply voltage	3,3 V ±10%
Storage Temperature	-55°C to +125°C
Output level	CMOS
Output symmetry	40-60% (45-55% avail.) ±10% at 50%VDD
Rise & Fall Time	200 nS
Input current max.	1,0 mA
Tristate	Yes
Output load	15 pF
Standby current	10µA max.
Aging	±3ppm





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

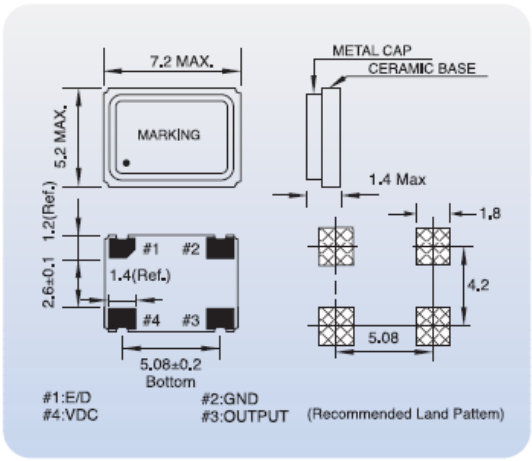
service@intertec-components.de
www.intertec-components.de

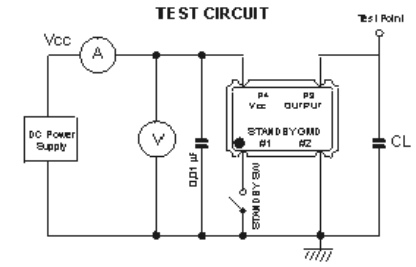
Edition December 2014

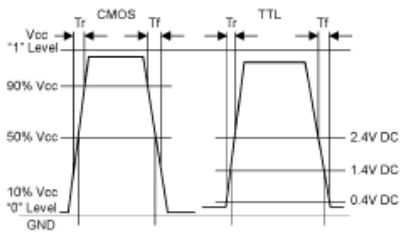
IO 21

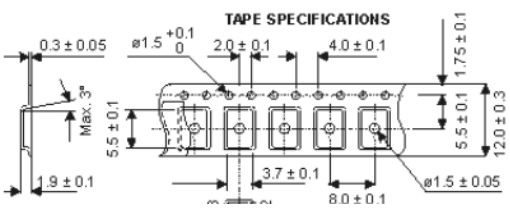
Clock Oscillator 5,0 V

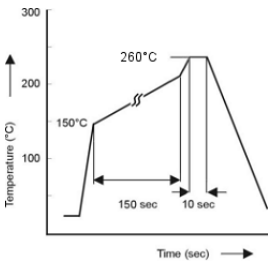
Dimensions l/w/h (max)		**7,2 mm x 5,2 mm x 1,4 mm**
Frequency range		0,5 MHz to 156,0 MHz
Operating Temperature		Refer to Ordering Guidance
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance
Storage Temperature		-55°C to +125°C
Output level		CMOS TTL
Output symmetry		45-55% (40-60% avail.) ±10% at 50%VDD
Power supply voltage		5,0 V ±10%
Input current	0,50 MHz ~ 9,99 MHz	7 mA
	10,0 MHz ~ 19,99 MHz	15 mA
	20,0 MHz ~ 49,99 MHz	30 mA
	50,0 MHz ~ 79,99 MHz	40 mA
	80,0 MHz ~ 135,00 MHz	60 mA
Rise & Fall time	0,50 MHz ~ 4,99 MHz	5 nS
	5,00 MHz ~ 19,99 MHz	4 nS
	20,0 MHz ~ 49,99 MHz	4 nS
	50,0 MHz ~ 79,99 MHz	3 nS
	80,0 MHz ~ 135,00 MHz	2 nS
Output load		15 pF
Tristate		yes
Aging		±3 ppm











RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

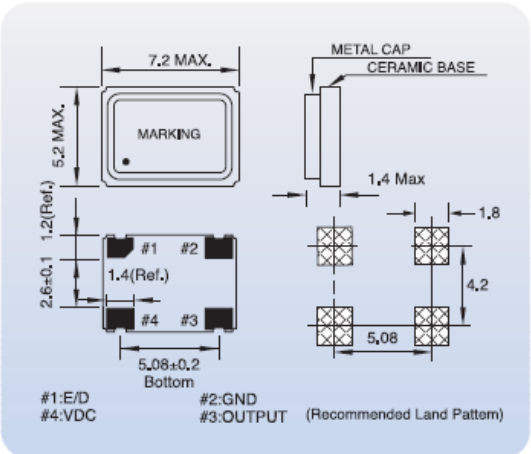
service@intertec-components.de
www.intertec-components.de

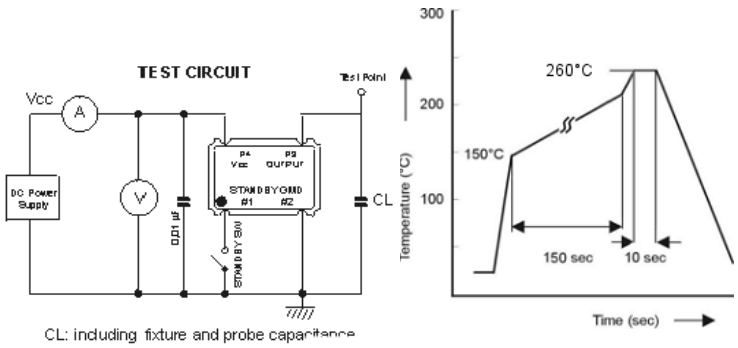
Edition December 2014

IO 22

Clock Oscillator 2,5 V/3,3 V
LOW EMI

Dimensions l/w/h (max)	**7,2 mm x 5,2 mm x 1,4 mm**		
Frequency range	13,0 MHz to 160,0 MHz		
Operating temperature	Refer to Ordering Guidance		
Frequency Stability in Operating Temp. Range	Refer to Ordering Guidance		
Storage temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	40-60% at 50%VDD		
Power supply voltage	2,5 V±10%		3,3 V±10%
Rise & Fall Time	13,0 MHz -49,99 MHz	5 nS	10 nS
	50,0 MHz -79,99 MHz	4 nS	8 nS
	80,0 MHz -99,99 MHz	3 nS	5 nS
	100,0 MHz -160 MHz	3 nS	4 nS
Input current max.	13,0 MHz -49,99 MHZ	20 mA	20 mA
	50,0 MHz -79,99 MHz	20 mA	25 mA
	80,0 MHz -91,99 MHz	25 mA	30 mA
	100,0 MHz -160,0 MHz	30 mA	40 mA
Output load	15 pF		
Tristate	yes		
Aging	±3 ppm		





CL: including fixture and probe capacitance

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

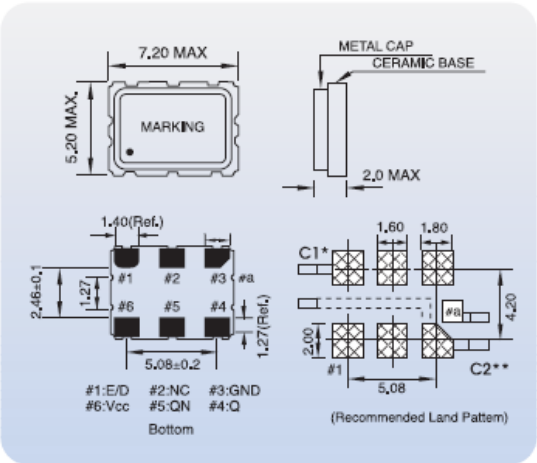
Edition December 2014

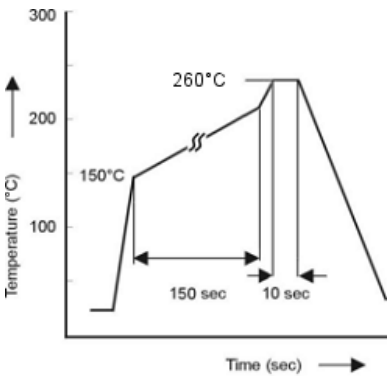
RED FREQUENCY

IO 23

Clock Oscillator 2,5 V/3,3 V LVPECL

Dimensions l/w/h (max)		**7,2 mm x 3,2 mm x 2,0 mm**	
Frequency range		25,0 MHz to 800,0 MHz	
Operating temperature		Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance	
Storage temperature		-55°C to +125°C	
Output load		50 Ohm	
Output symmetry		45-55% at 50%VDD	
Power supply voltage		2,5 V ±5%	3,3 V ±10%
Rise & Fall Time 20%/80%	40,0 MHz -100,99 MHz	1,0 nS	1,0 nS
	101,0 MHz -160,00 MHz	0,5 nS	0,5 nS
	161,0 MHz - 800,00 MHz	1,0 nS	1,0 nS
Input current max.	25,0 MHz -100,99 MHz	60 mA	60 mA
	101,0 MHz -160,00 MHz	65 mA	65 mA
	161,0 MHz -800,0 MHz	100 mA	100 mA
Output Voltage High (VOH)		1,475 V min	2,275 V min
Output Voltage Low (VOL)		1,095 V max	1,680 V max
Enable High Input Voltage		1,75 V min	2,31 V min
Enable Low Input Voltage		0,75 V max	0,99 V max
Aging		±3 ppm	





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

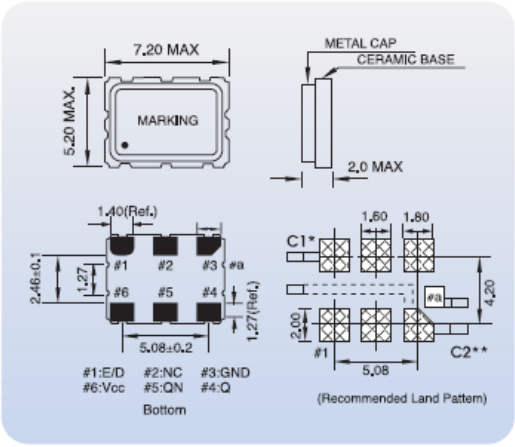
service@intertec-components.de
www.intertec-components.de

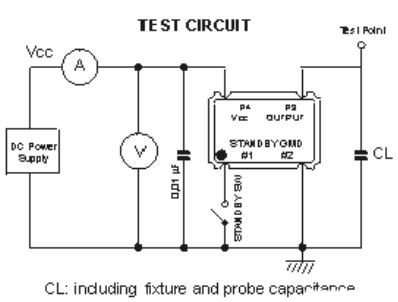
Edition December 2014

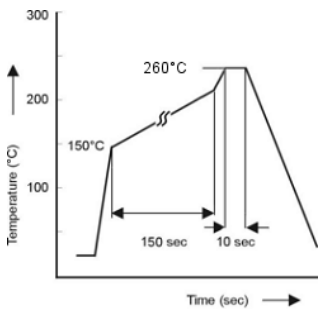
IO 24

Clock Oscillator 2,5 V/3,3 V LVDS

Dimensions l/w/h (max)		**7,2 mm x 3,2 mm x 2,0 mm**	
Frequency range		40,0 MHz to 800,0 MHz	
Operating temperature		Refer to Ordering Guidance	
Frequency Stability in Operating Temp. Range		Refer to Ordering Guidance	
Storage temperature		-55°C to +125°C	
Output load between Q and QN		100 Ohm	
Output symmetry		45-55%	
Power supply voltage		2,5 V ±5%	3,3 V ±10%
Rise & Fall Time 20%/80%	40,0 MHz -100,0 MHz	1,0 nS	1,0 nS
	101,0 MHz -160,00 MHz	0,5 nS	0,5 nS
	161,0 MHz - 800,00 MHz	1,5 nS	1,5 nS
Input current max.	40,0 MHz -100,0 MHz	60 mA	60 mA
	101,0 MHz -160,00 MHz	65 mA	65 mA
	161,0 MHz -800,00 MHz	100 mA	110 mA
Output Voltage High (VOH)		1,6 V min	1,6 V min
Output Voltage Low (VOL)		0,9 V max	0,9 V max
Differential Output Voltage (VOD)		247-454 mV	247-454 mV
Offset Voltage (VOS)		1,125-1,375 V	1,125-1,375 V
Enable High Input Voltage		1,75 V min	2,31 V min
Enable Low Input Voltage		0,75 V max	0,99 V max
Aging		±3 ppm	







RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

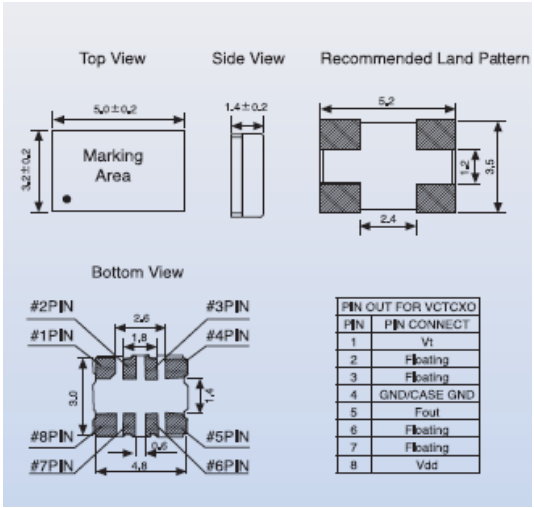
service@intertec-components.de
www.intertec-components.de

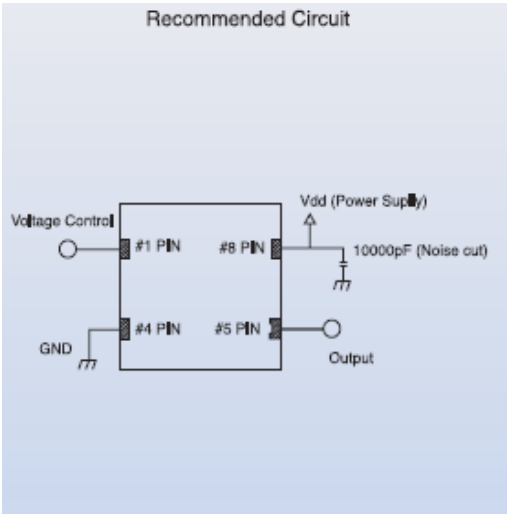
Edition December 2014

IO 26

VCTCXO Voltage Controlled Temperature Compensated Crystal Oscillator
2,7 V/3,3 V

Dimensions l/w/h (max)	**5,2 mm x 3,4 mm x 1,6 mm**
Frequency range	10,0 MHz to 30,0 MHz
Operating temperature	Refer to Ordering Guidance
Storage temperature	-40°C to +85°C
Frequency Tolerance (Vcon=1,5 V)	± 2,0 ppm max at 25°C
Power supply voltage	2,7 V or 3,3 V
Frequency Stability	
Over Temperature Range	±2,0 ppm
Over Supply Voltage Change (±5%)	±0,2 ppm
Over Load Change	±0,2 ppm
VCON Frequency Control Range (1.5±1,0V)	±9 ~ ±16 ppm / V
Start up Time (90% of final RF level in Vp-p)	3,0msec max.
Harmonics	-7,0dBc max.
SSB Phase Noise (at 1 KHz Carrier Offset)	-130dBc/Hz max.
Aging	±1 ppm





RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

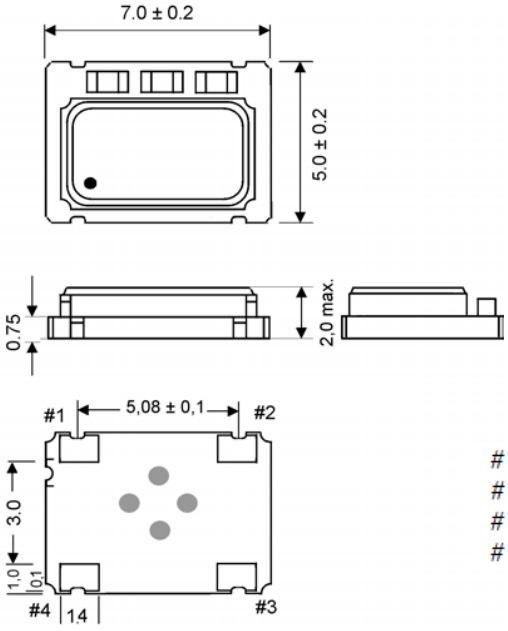
Edition December 2014

RED FREQUENCY

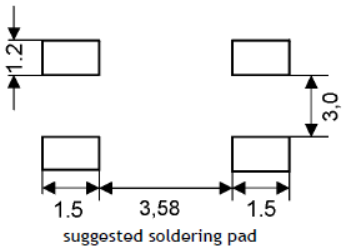
IO 27

VCTCXO Voltage Controlled Temperature Compensated Crystal Oscillator

Dimensions l/w/h (max)	**7,2 mm x 5,2 mm x 2,0 mm**
Frequency range	10,0 MHz to 30,0 MHz
Operating temperature	Refer to Ordering Guidance
Storage temperature	-40°C to +85°C
Frequency Tolerance (Vcon=1,5 V)	± 2,0 ppm max at 25°C
Power supply voltage	3,0 V
Frequency Stability	
Over Temperature Range	±2,0 ppm
Over Supply Voltage Change (±5%)	±0,2 ppm
Over Load Change	±0,2 ppm
VCON Frequency Control Range (1.5±1,0 V)	±9 ~ ±16 ppm / V
Start up Time (90% of final RF level in Vp-p)	3,0msec max.
Harmonics	-7,0dBc max.
SSB Phase Noise (at 1 KHz Carrier Offset)	-130dBc/Hz max.
Aging	±1 ppm



1 : VC
2 : GND
3 : Output
4 : Vcc



RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

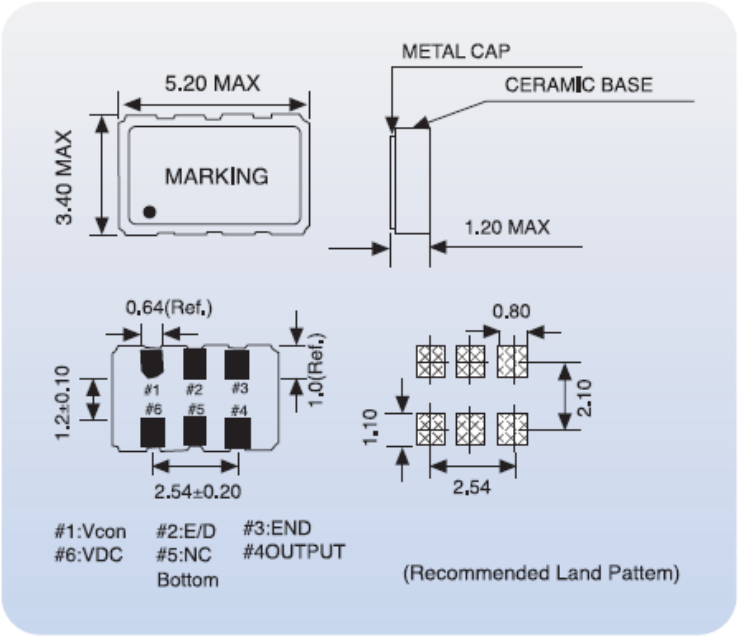
service@intertec-components.de
www.intertec-components.de

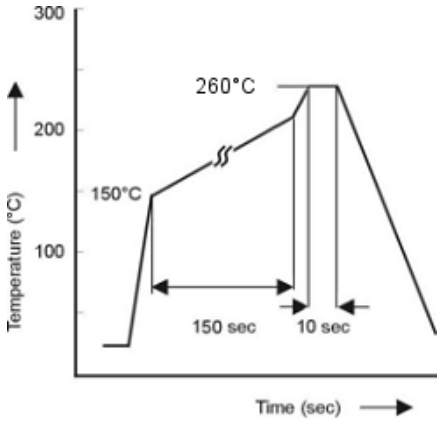
Edition December 2014

IO 28

VCXO Voltage Controlled Crystal Oscillator
3,3 V/5,0 V

Dimensions l/w/h (max)	**5,2 mm x 3,4 mm x 1,2 mm**
Frequency range	1,0 MHz to 52,0 MHz
Operating temperature	Refer to Ordering Guidance
Storage temperature	-55°C to +125°C
Frequency Control Range	± 30 ppm ~ ±150 ppm
Power supply voltage	3,3 V /5,0 V ±10%
Output Level	CMOS
Output Symmetry	40-60% (45-55% available)
Input current	30 mA max
Rise & Fall Time	5 nS max
Output Load	15 pF
Aging	±1 ppm





Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

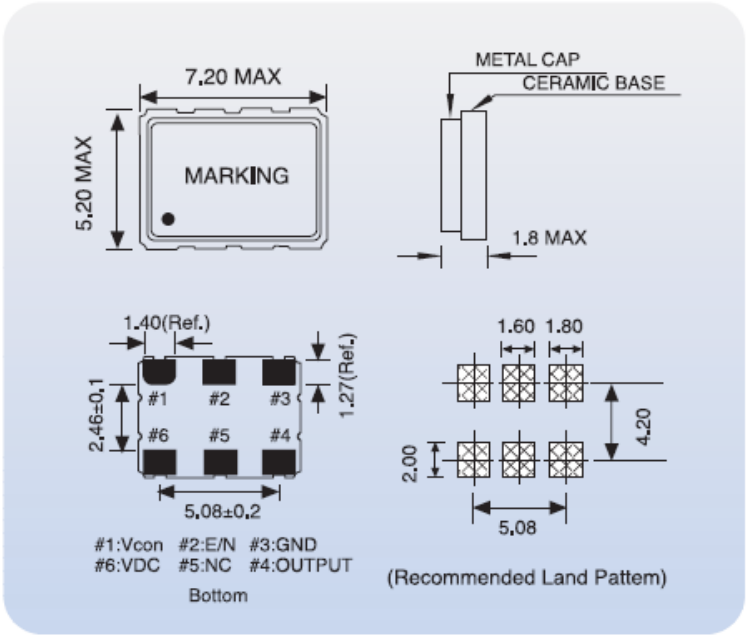
service@intertec-components.de
www.intertec-components.de

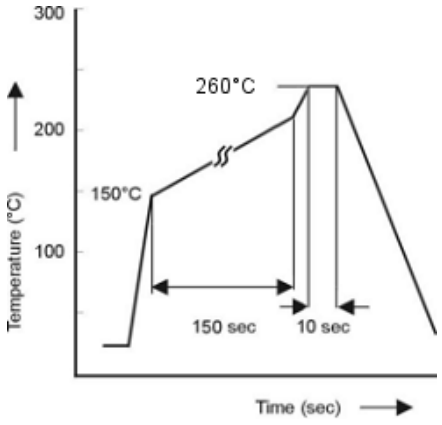
Edition December 2014

IO 29

VCXO Voltage Controlled Crystal Oscillator
3,3 V/5,0 V

Dimensions l/w/h (max)	**7,2 mm x 5,2 mm x 1,8 mm**
Frequency range	1,0 MHz to 52,0 MHz
Operating temperature	Refer to Ordering Guidance
Storage temperature	-55°C to +125°C
Frequency Control Range	± 30 ppm ~ ±150 ppm
Power supply voltage	3,3 V /5,0 V ±10%
Output Level	CMOS
Output Symmetry	40-60% (45-55% available)
Input current	30 mA max
Rise & Fall Time	5 nS max
Output Load	15 pF
Aging	±1 ppm





Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

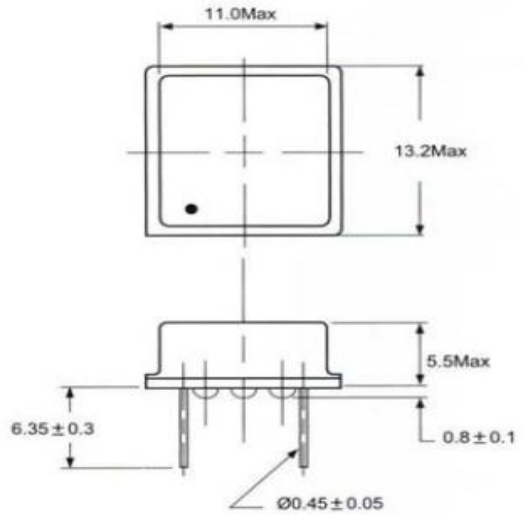
service@intertec-components.de
www.intertec-components.de

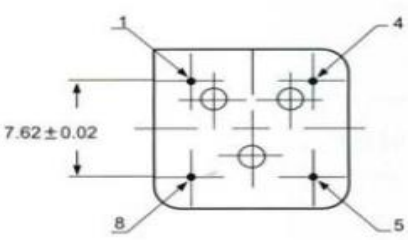
Edition December 2014

IO 30

Oscillator
1,8 V/2,5 V/3,3 V/5,0 V

Dimensions l/w/h (max)	**11,0 mm x 13,2 mm x 5,5 mm**				
Frequency range	0,4 MHz to 200,0 MHz				
Operating temperature	Refer to Ordering Guidance				
Storage temperature	-55°C to +125°C				
Frequency Control Range	± 10 ppm ~ ±100 ppm				
Output Level	TTL or CMOS				
Output Symmetry	45/55% or 40-60% optional				
Input current 0,40 MHz ~ 24,99 MHz	25 mA				
25,0 MHz ~ 99,99 MHz	40 mA				
100,0 MHz ~ 200,0 MHz	60 mA				
Power supply voltage	1,8 V	2,5 V	3,3 V	5,0 V	±10%
Rise & Fall Time	8 nS	8 nS	8 nS	10 nS	
Output Load	15 pF				
Aging first year	±5 ppm				





PIN	FUNCTION
# 1	NC or Tri-state E/D
# 4	GROUND
# 5	OUTPUT
# 8	VDD

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

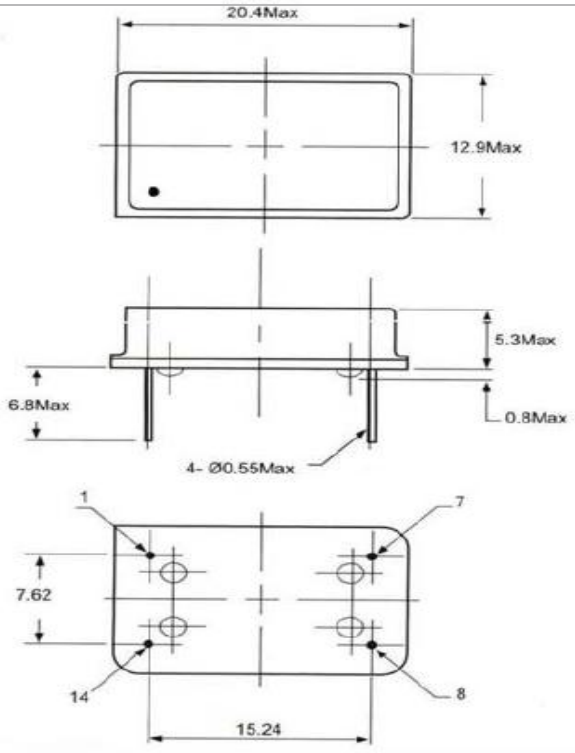
service@intertec-components.de
www.intertec-components.de

Edition December 2014

IO 31

Oscillator
1,8 V/2,5 V/3,3 V/5,0 V

Dimensions l/w/h (max)	**20,4 mm x 12,9 mm x 5,3 mm**				
Frequency range	0,4 MHz to 200,0 MHz				
Operating temperature	Refer to Ordering Guidance				
Storage temperature	-55°C to +125°C				
Frequency Control Range	± 10 ppm ~ ±100 ppm				
Output Level	TTL or CMOS				
Output Symmetry	45/55% or 40-60% optional				
Input current 0,40 MHz ~ 24,99 MHz	25 mA				
25,0 MHz ~ 99,99 MHz	40 mA				
100,0 MHz ~ 200,0 MHz	60 mA				
Power supply voltage	1,8 V	2,5 V	3,3 V	5,0 V	±10%
Rise & Fall Time	8 nS	8 nS	8 nS	10 nS	
Output Load	15 pF				
Aging first year	±5 ppm				



PIN	FUNCTION
# 1	NC or Tri-state E/D
# 7	GROUND
# 8	OUTPUT
# 14	VDD

RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

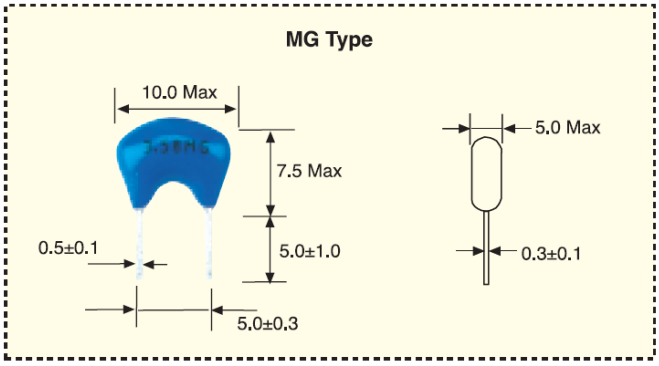
Edition December 2014

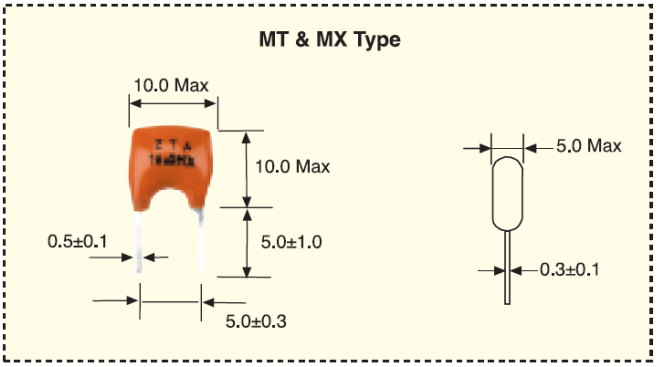
IR ZTA

Ceramic Resonator

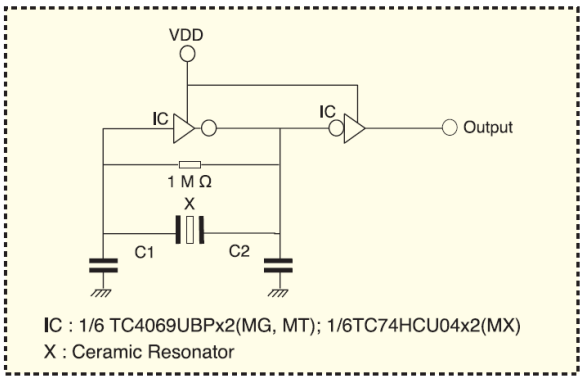
Part Number	Frequency Range (MHz)	Frequency Accuracy	Stability in Temperature (-25°C ~ +85°C)	Aging for Ten Years	Load Capacitance C1 C2
IRZTA MG	1,79 – 8,00	±0,5%	±0,3%	±0,3%	30 pF
IRZTA MT	6,00 – 13,00	±0,5%	±0,3%	±0,3%	30 pF
IRZTA MX	12,00 – 60,00	±0,5%	±0,3%	±0,3%	30 pF (13,01~20,0 MHz) 15pF (20,01~25,99MHz) 5pF (26,00~60,00MHz)

Dimensions (Unit: mm)





Test Circuit:



RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

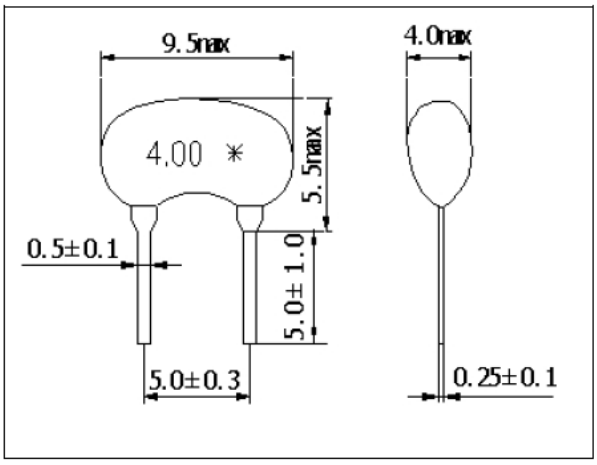
Edition December 2014

IR ZTAWS

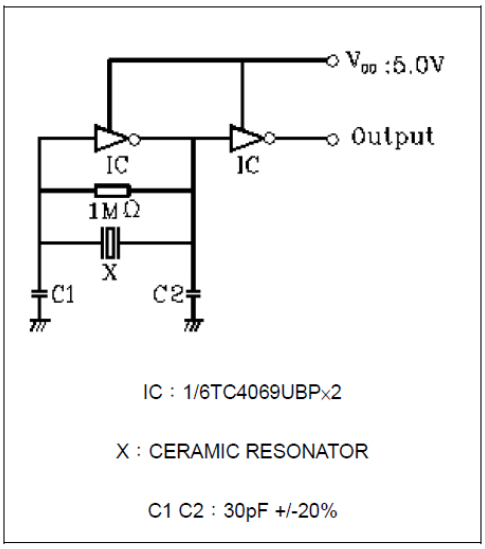
Ceramic Resonator

Item	Specification
Oscillation Frequency	1,79 ~ 6,00 MHz
Frequency Accuracy	±0,5%
Resonant Impedance (Ω) max	30
Temperature Coefficient of Oscillation Frequency max	±0,3% (Oscillation Frequency drift -25°C ~+85°C)
Aging Rate max for ten years	±0,3%
Rating Voltage max	6 VDC 15Vp-p
Insulation Resistance	100M Ω min
Withstanding Voltage	100 VDC, 5 second max

Dimensions: (Unit: mm)



Test Circuit:



Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

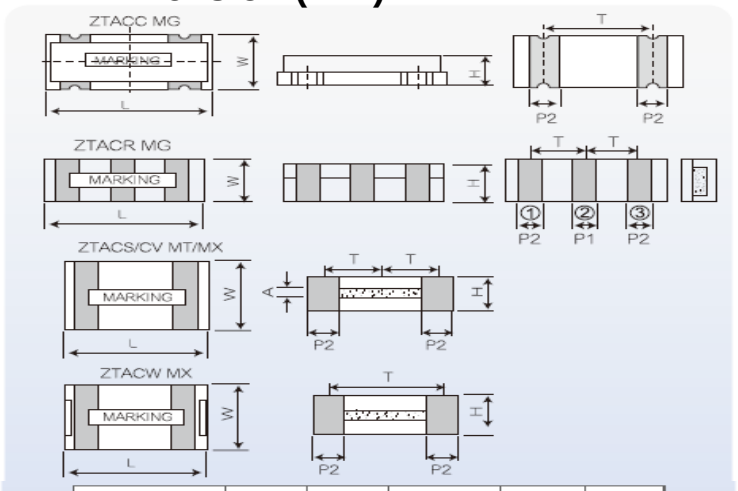
IR ZTAC

Ceramic Resonator

Specification

MODEL		ZTACC MG	ZTACR MG	ZTACS MT	ZTACV MT	ZTACS MX	ZTACV MX	ZTACW MX
Nominal Frequency	MHz	2.00~8.00	4.00~8.00	6.00~13.00	8.00~13.00	13.01~60.00	16.00~60.00	20.00~60.00
Frequency Tolerance (25 °C)	%	±0.5						
Frequency Stability (-20~+80°C)	%	±0.3	±0.3	± 0.4	±0.4	±0.3	±0.3	±0.3
Operating Temperature Range	°C	-20 to +80						
Storage Temperature Range	°C	-55 to +85						
Aging for 10 years	%	±0.3						
Test Circuit for MOS IC	MG Series	1/6TC4069UBP x2						
	MT Series	1/6TC4069UBP x2						
	MX Series	1/6TC74HCU04 x2						
External capacitance C1, C2	2.00~20.00MHz	30pF						
	20.01~25.99MHz	15pF						
	26.00~60.00MHz	5pF						

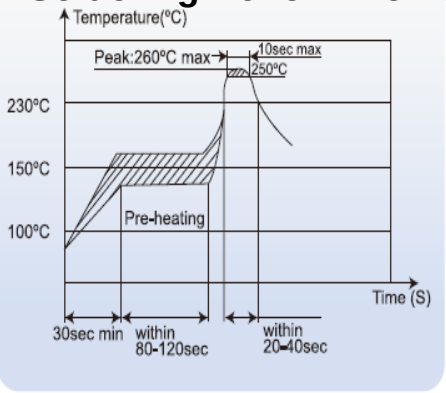
Dimension (mm)



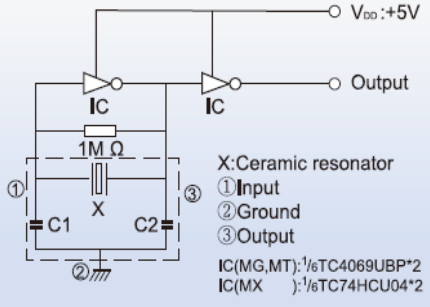
Part Number	L	W	H	P2	T
ZTACC MG	7.4±0.2	3.4±0.2	1.8±0.2	1.2±0.2	5±0.2
ZTACR MG	4.5±0.2	2.0±0.2	1.2max.	0.8±0.2	3.0±0.2
ZTACS MT/MX	4.7±0.2	4.1±0.2	(1.2+A*)±0.2	0.8±0.2	3.9±0.2
ZTACV MT/MX	3.7±0.2	3.1±0.2	(1.0+A*)±0.2	0.7±0.2	3.0±0.2
ZTACW MX	2.5±0.2	2.0±0.2	1.2max.	0.4±0.2	2.0±0.2

*A stands for thickness, which varies with the frequency. The range of the thickness is 0.1 to 0.7mm.

Soldering Reflow Profile



Test Circuit for MOS IC



RoHS conf./Pb free

ISO 9001 certified

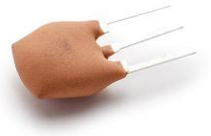
Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

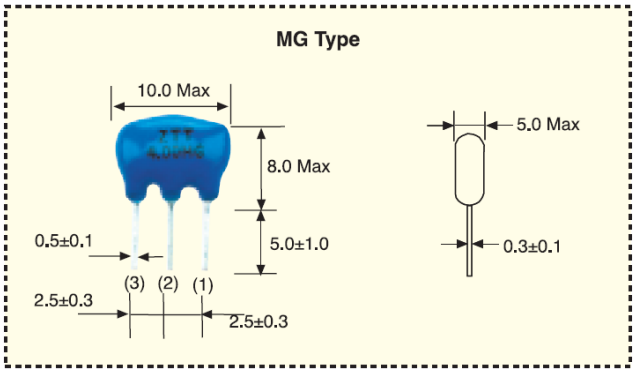
IR ZTT

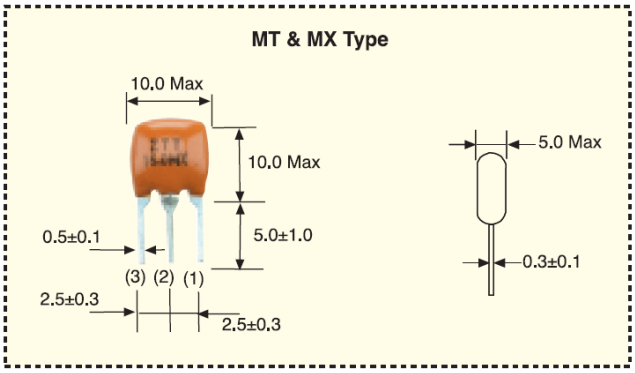


Ceramic Resonator

Part Number	Frequency Range (MHz)	Frequency Accuracy	Stability in Temperature (-25°C ~ +85°C)	Aging for Ten Years	Load Capacitance C1 C2
IRZTT MG	1,79 – 8,00	±0,5%	±0,3%	±0,3%	See Table 1
IRZTT MT	6,00 – 13,00	±0,5%	±0,3%	±0,3%	
IRZTT MX	12,00 – 60,00	±0,5%	±0,3%	±0,3%	

Dimensions (Unit: mm)





Test Circuit:

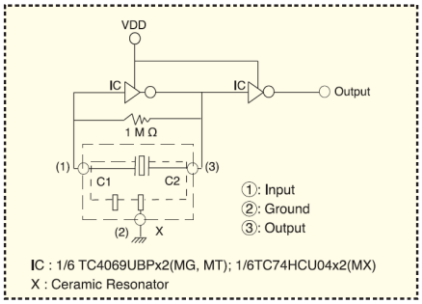


Table 1:

Circuit constants	
Frequency	C1, C2
1.80 ~ 8MHz	30pF
6.01 ~ 13.0MHz	22pF
13.0 ~ 20.0MHz	30pF
20.01 ~ 25.99MHz	15pF
26.00 ~ 60.00MHz	5pF

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

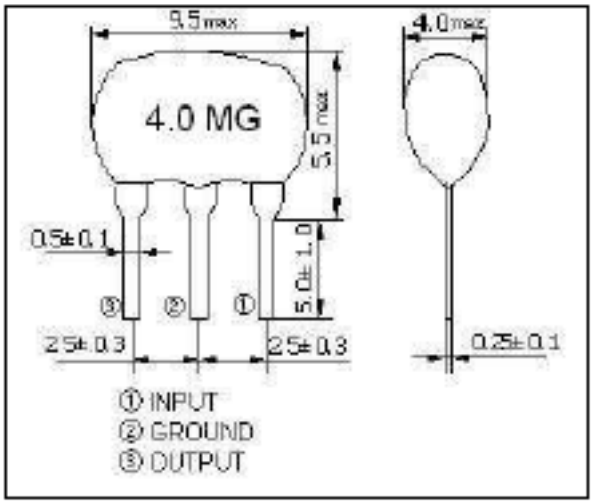
Edition December 2014

IR ZTTWS

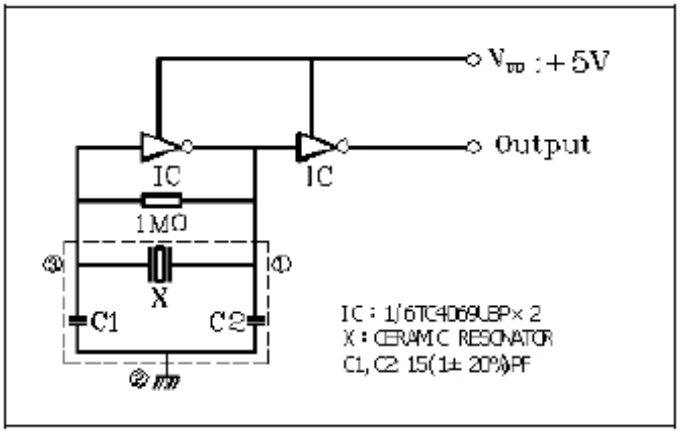
Ceramic Resonator

Item	Specification
Oscillation Frequency	1,79 ~ 6,00 MHz/ 3,00 ~ 8,00 MHz
Frequency Accuracy	±0,5%
Temperature Coefficient of Oscillation Frequency max	±0,3% (Oscillation Frequency drift -25°C ~+85°C)
Resonant Impedance (Ω) max	30
Aging Rate max for ten years	±0,3%
Rating Voltage max	6 VDC 15Vp-p
Withstanding Voltage UR	100 DC, 1 min

Dimensions: (Unit: mm)



Test Circuit:

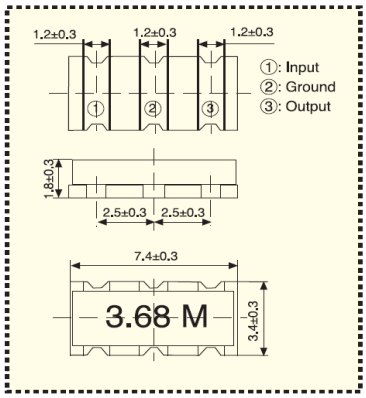


IR ZTTCC MG

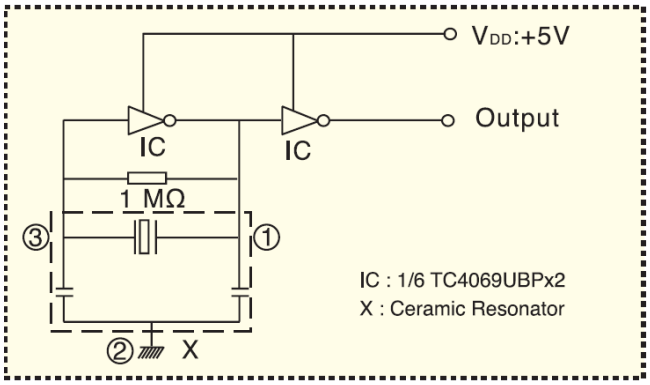
Ceramic Resonator

Item	Specification
Oscillation Frequency	1,80 ~ 8,00 MHz
Frequency Accuracy	±0,5%
Temperature Coefficient of Oscillation Frequency max	±0,3% (Oscillation Frequency drift -20°C ~+80°C)
Aging Rate max for ten years	±0,3%
Rating Voltage max	6 VDC 15Vp-p
Withstanding Voltage UR	100 DC, 1 min

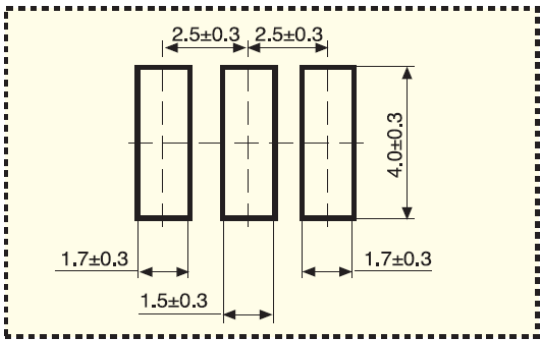
Dimension (Unit: mm)



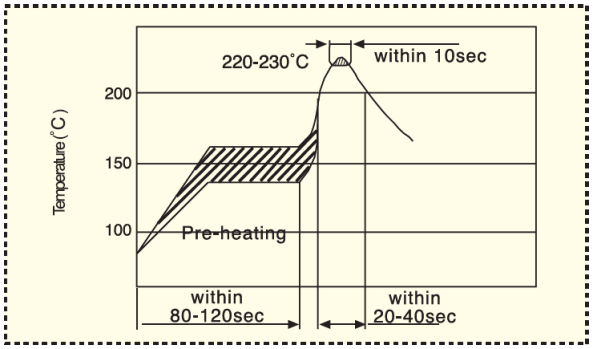
Test Circuit



Recommended Land Pattern



Recommended Reflow Soldering



Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

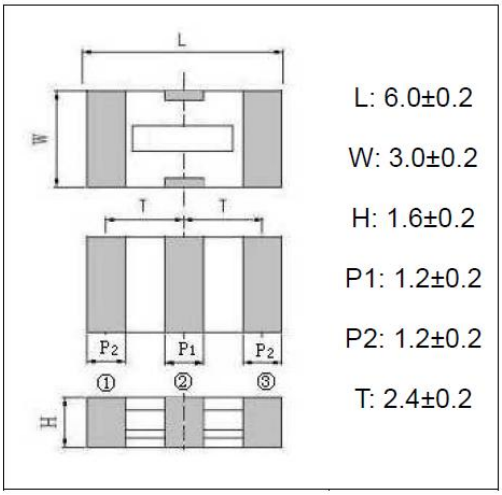
Edition December 2014

IR ZTTCP

Ceramic Resonator

Item	Specification
Oscillation Frequency	2,00 ~ 12,00 MHz
Frequency Accuracy	±0,5%
Temperature Coefficient of Oscillation Frequency max	±0,2% (Oscillation Frequency drift -20°C ~+80°C)
Aging Rate max for ten years	±0,1%
Rating Voltage max	6 VDC 15Vp-p
Withstanding Voltage UR	100 DC, 1 min

Dimension (Unit: mm)



L: 6.0±0.2

W: 3.0±0.2

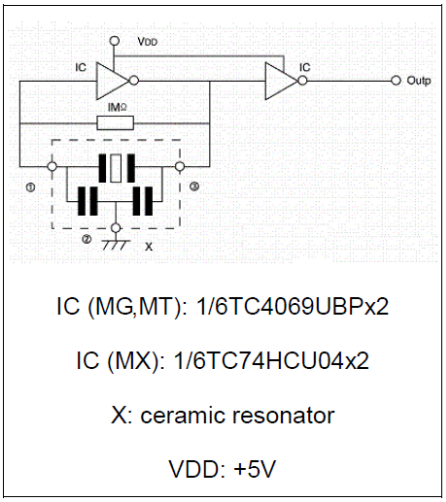
H: 1.6±0.2

P1: 1.2±0.2

P2: 1.2±0.2

T: 2.4±0.2

Test Circuit



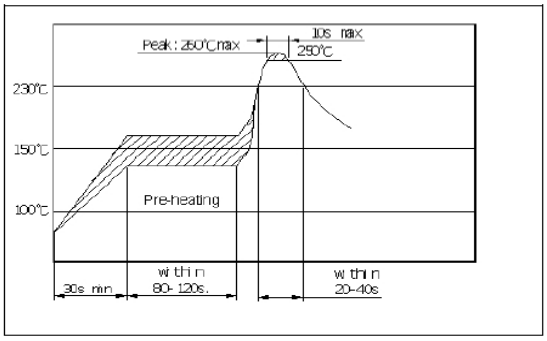
IC (MG,MT): 1/6TC4069UBPx2

IC (MX): 1/6TC74HCU04x2

X: ceramic resonator

VDD: +5V

Reflow Soldering Condition



RoHS conf./Pb free

ISO 9001 certified

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

IS IF

IF SAW FILTER

Dimensions l/w/h in mm (max)	3,0 x 3,0 3,8 x 3,8 5,0 x 5,0 7,0 x 5,0 F11 or TO39
Frequency Range	35.46 MHz ~ 666.667 MHz
Operating Temperature	-20°C to +70°C
Input Power Level	0~10dBm
Pass Band	0 ~ 400 MHz
Storage Temperature	-40°C to +85°C
Insertion Loss (IL)	30dB max.
Bandwith (1dB ~ 30dB) Attenuation (Reference level from Min IL) Applications	15,0 MHz max. 10dB min. DAB, Cable Modem, Remote Control, WLL, Satellite TV, WLAN, Cellulare phones, PHS, DECT

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany
Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20
service@intertec-components.de
www.intertec-components.de
Edition December 2014

IS RF

RF SAW FILTER

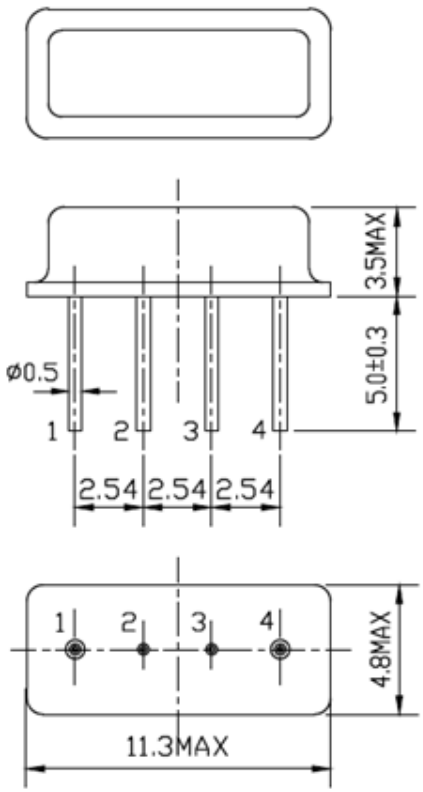
Dimensions l/w/h in mm (max)	3,0 x 3,0 3,8 x 3,8 5,0 x 5,0 7,0 x 5,0 F11 or TO39
Frequency Range	139 ~ 2650 MHz
Operating Temperature	-20°C to +70°C
DC Voltage	0 ~ 10 V
Input Power Level	0~10dBm
Pass Band	0 ~ 100 MHz
Storage Temperature	-40°C to +85°C
Insertion Loss (IL)	7,0dB max.
Amplitude Ripple	3,0dB max.
Bandwith (1dB ~ 30dB)	15,0 MHz max.
Attenuation (Reference level from Min IL)	15dB min.
Applications	DAB, Cable Modem, Remote Control, Pager, Sat.TV, FRS,Cellulare phones, GPS, ISM Band, Bluetooth

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany
Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20
service@intertec-components.de
www.intertec-components.de
Edition December 2014

IS SR F11

1. Package Dimension

Unit: mm



Package Material	
CAP	Cu plating Ni
BASE	Cu plating Ni

Pin No.	Function
1.	Input
2.	Ground
3.	Ground
4.	Output

2. Marking

IS SR	Item code
433M92	Frequency

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

3. Performance

3.1 Application

One-port SAW Resonator for Wireless Remote Controller.

Center frequency: 433.92MHz

3.2 Maximum Rating

Rating		Value	Unit
Operating Temperature Range	T_A	-40 ~ +85	°C
Storage Temperature Range	T_{stg}	-45 ~ +85	°C
DC Voltage (between any Terminals)	V_{DC}	10	V
RF Power (in *BW*)	*P*	0	dBm
ESD Voltage (HB)	V_{ESD}	150	V

Electrostatic **S**ensitive **D**evice (**ESD**)

3.3 Electronic Characteristics

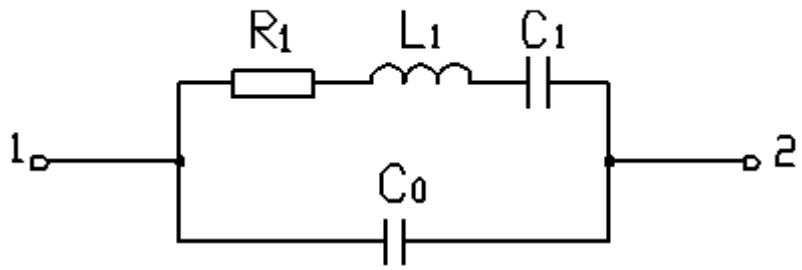
Item	Unit	Minimum	Typical	Maximum
Center Frequency (fo)	MHz	433.845	433.920	433.995
Insertion Loss	dB	—	1.5	2.5
Quality Factor	—	—	—	—
Unloaded Q	—	—	12,800	—
50Ω Loaded Q	—	—	2,000	—
Temperature Stability	—	—	—	—
Turnover Temperature	□	10	25	40
Turnover Frequency	KHz	—	f_0±1.3	—
Frequency Temperature Coefficient	ppm/□2	—	0.032	—
Frequency Aging	ppm/yr	—	<±10	—
DC Insulation Resistance	MΩ	1.0	—	—
RF Equivalent RLC Model	—	—	—	—
Motional Resistance R_1	Ω	—	18	26
Motional Inductance L_1	μH	—	75	—
Motional Capacitance C_1	fF	—	1.8	—
Pin1 to Pin2 Static Capacitance C_0	pF	1.7	2.0	2.3
Transducer Static Capacitance C_0	pF	—	2.3	—

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

3.3 Equivalent LC Model



4. Performance

4.1 Mechanical Shock:

The components shall remain within the electrical specifications after 1000 shocks, acceleration 392 m/s2, duration 6 milliseconds.

4.2 Vibration Fatigue:

The components shall remain within the electrical specifications after loaded vibration at 20 Hz, amplitude 1.5 mm, for 2 hours.

4.3 Terminal Strength:

The components shall remain within the electrical specifications after pulled 2 kgs weight for 10 seconds towards an axis of each terminal.

4.4 High Temperature Storage:

The components shall remain within the electrical specifications after being kept at the 85℃±2℃ for 16 hours, then kept at room temperature for 2 hours.

4.5 Low Temperature Storage:

The components shall remain within the electrical specifications after being kept at the -20℃±2℃ for 16 hours, then kept at room temperature for 2 hours.

4.6 Temperature Cycle:

The components shall remain within the electrical specifications after 5 cycles of high and low temperature testing (one cycle: 80℃ for 30 minutes → 25℃ for 5 minutes→ -40℃for 30 minutes)than kept at room temperature for 2 hours.

4.7 Humidity Test:

The components shall remain within the electrical specifications after being kept at the condition of ambient temperature 40±2℃, and 90~95% RH for 48 hours, then kept at room temperature and normal humidity for 2 hours.

4.8 Solder-heat Resistance:

The components shall remain within the electrical specifications after dipped in the solder at 260℃ for 10±1 seconds, then kept at room temperature for 2 hours. (Terminal must be dipped leaving 1.5 mm from the case).

4.9 Solderability:

Solderability of terminal shall be kept at more than 80% after dipped in the solder flux at 245℃±5℃ for 5±1 seconds.

5. Remarks

5.1 Static voltage:

Static voltage between signal load & ground may cause deterioration & destruction of the component. Please avoid static voltage.

5.2 Ultrasonic cleaning:

Ultrasonic vibration may cause deterioration & destruction of the component. Please avoid ultrasonic cleaning.

5.3 Soldering:

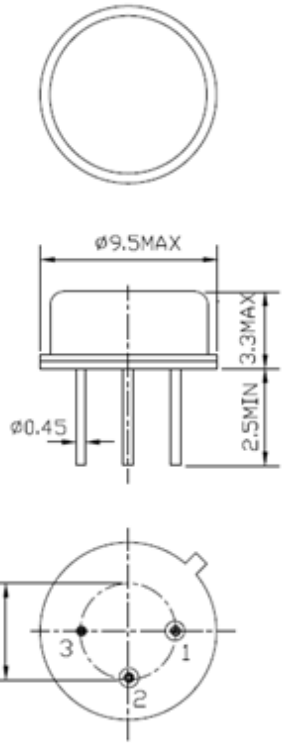
Only leads of component may be soldered. Please avoid soldering another part of component.

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany
Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20
service@intertec-components.de
www.intertec-components.de
Edition December 2014

IS SR TO39

1. Package Dimension

Unit: mm



Package Material	
CAP	Cu plating Ni
BASE	Cu plating Ni

Pin No.	Function
1.	Input
2.	Output
3.	Ground

2. Marking

IS SR	Item code
433M92	Frequency

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

3. Performance

3.1 Application

One-port SAW Resonator for Wireless Remote Controller.
Center frequency: 433.92MHz

3.2 Maximum Rating

Rating		Value	Unit
Operating Temperature Range	T_A	-40 ~ +85	°C
Storage Temperature Range	T_{stg}	-45 ~ +85	°C
DC Voltage (between any Terminals)	V_{DC}	10	V
RF Power (in *BW*)	*P*	0	dBm
ESD Voltage (HB)	V_{ESD}	150	V

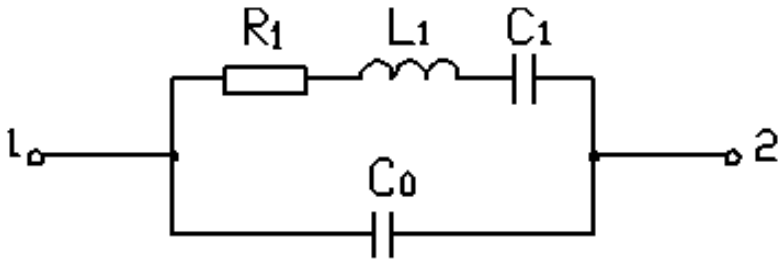
Electrostatic **S**ensitive **D**evice (**ESD**)

3.3 Electronic Characteristics

Item	Unit	Minimum	Typical	Maximum
Center Frequency (fo)	MHz	433.845	433.920	433.995
Insertion Loss	dB	—	1.5	2.5
Quality Factor	—	—	—	—
Unloaded Q	—	—	12,800	—
50Ω Loaded Q	—	—	2,000	—
Temperature Stability	—	—	—	—
Turnover Temperature	□	20	35	50
Turnover Frequency	KHz	—	f_0±1.3	—
Frequency Temperature Coefficient	ppm/□2	—	0.032	—
Frequency Aging	ppm/yr	—	<±10	—
DC Insulation Resistance	MΩ	1.0	—	—
RF Equivalent RLC Model	—	—	—	—
Motional Resistance R_1	Ω	—	18	26
Motional Inductance L_1	μH	—	86	—
Motional Capacitance C_1	fF	—	1.5	—
Pin1 to Pin2 Static Capacitance C_0	pF	1.7	2.0	2.3
Transducer Static Capacitance C_0	pF	—	1.9	—

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany
Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20
service@intertec-components.de
www.intertec-components.de

3.3 Equivalent LC Model



4. Performance

4.1 Mechanical Shock:

The components shall remain within the electrical specifications after 1000 shocks, acceleration 392 m/s2, duration 6 milliseconds.

4.2 Vibration Fatigue:

The components shall remain within the electrical specifications after loaded vibration at 20 Hz, amplitude 1.5 mm, for 2 hours.

4.3 Terminal Strength:

The components shall remain within the electrical specifications after pulled 2 kgs weight for 10 seconds towards an axis of each terminal.

4.4 High Temperature Storage:

The components shall remain within the electrical specifications after being kept at the 85℃ ± 2℃ for 16 hours, then kept at room temperature for 2 hours.

4.5 Low Temperature Storage:

The components shall remain within the electrical specifications after being kept at the -20℃ ± 2℃ for 16 hours, then kept at room temperature for 2 hours.

4.6 Temperature Cycle:

The components shall remain within the electrical specifications after 5 cycles of high and low temperature testing (one cycle: 80℃ for 30 minutes → 25℃ for 5 minutes→ -40℃for 30 minutes)than kept at room temperature for 2 hours.

4.7 Humidity Test:

The components shall remain within the electrical specifications after being kept at the condition of ambient temperature 40 ± 2℃, and 90~95% RH for 48 hours, then kept at room temperature and normal humidity for 2 hours.

4.8 Solder-heat Resistance:

The components shall remain within the electrical specifications after dipped in the solder at 260℃ for 10 ± 1 seconds, then kept at room temperature for 2 hours. (Terminal must be dipped leaving 1.5 mm from the case).

4.9 Solderability:

Solderability of terminal shall be kept at more than 80% after dipped in the solder flux at 245℃ ± 5℃ for 5 ± 1 seconds.

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

5. Remarks

5.1 Static voltage:

Static voltage between signal load & ground may cause deterioration & destruction of the component. Please avoid static voltage.

5.2 Ultrasonic cleaning:

Ultrasonic vibration may cause deterioration & destruction of the component. Please avoid ultrasonic cleaning.

5.3 Soldering:

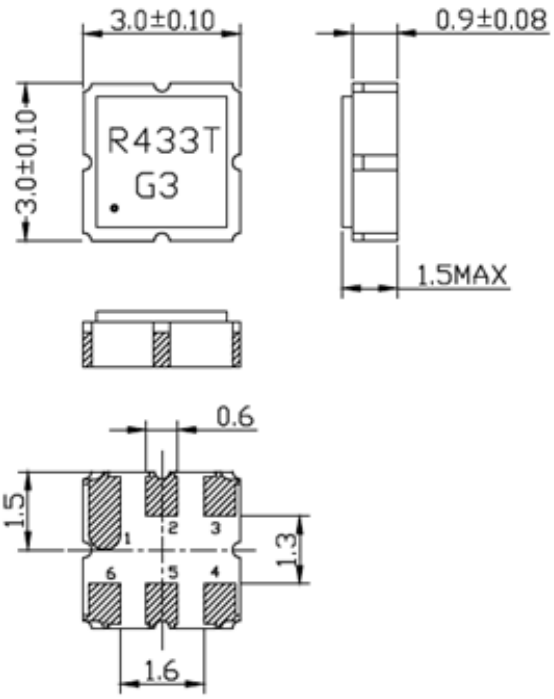
Only leads of component may be soldered. Please avoid soldering another part of component.

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany
Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20
service@intertec-components.de
www.intertec-components.de
Edition December 2014

IS SR DCC6C

1. Package Dimension

Unit: mm



Pin No.	Function
2	Input
5	Output
Others	GND

2. Marking

IS SR	Item code
433M92	Frequency

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

3. Performance

3.1 Application

One-port SAW Resonator for Wireless Remote Controller.

Center frequency: 433.92MHz

3.2 Maximum Rating

Rating		Value	Unit
Operating Temperature Range	T_A	-40 ~ +85	°C
Storage Temperature Range	T_{stg}	-45 ~ +85	°C
DC Voltage (between any Terminals)	V_{DC}	10	V
RF Power (in *BW*)	*P*	0	dBm
ESD Voltage (HB)	V_{ESD}	150	V

Electrostatic **S**ensitive **D**evice (**ESD**)

3.3 Electronic Characteristics

Item	Unit	Minimum	Typical	Maximum
Center Frequency (fo)	MHz	433.845	433.920	433.995
Insertion Loss	dB	—	1.4	1.9
Quality Factor	—	—	—	—
Unloaded Q	—	8,000	12,800	—
50Ω Loaded Q	—	1,000	2,000	—
Temperature Stability	—	—	—	—
Turnover Temperature	□	10	25	40
Turnover Frequency	KHz	—	f_0±1.3	—
Frequency Temperature Coefficient	ppm/□2	—	0.032	—
Frequency Aging	ppm/yr	—	<±10	—
DC Insulation Resistance	MΩ	1.0	—	—
RF Equivalent RLC Model	—	—	—	—
Motional Resistance R_1	Ω	—	17	26
Motional Inductance L_1	μH	—	70.743	—
Motional Capacitance C_1	fF	—	1.9	—
Pin1 to Pin2 Static Capacitance C_0	pF	—	2.0	—

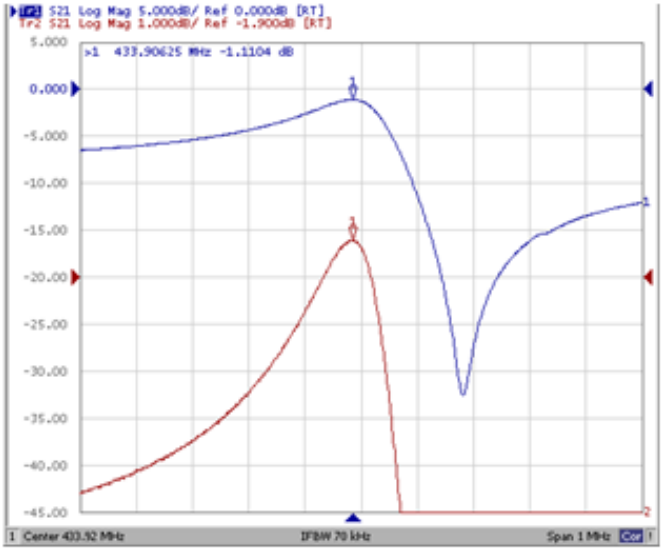
Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

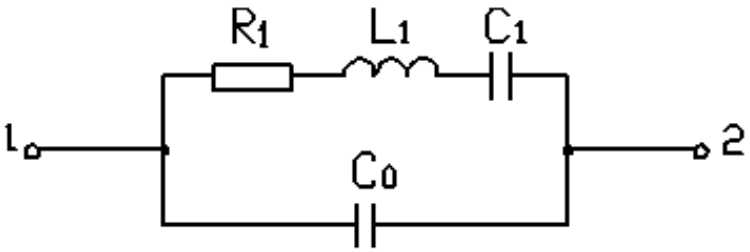
service@intertec-components.de
www.intertec-components.de

Edition December 2014

3.3 Frequency Characteristics



3.4 Equivalent LC Model



4. Performance

4.1 Thermal Shock:

The components shall remain within the electrical specifications after being kept at the condition of heat cycle conditions: TA=-40℃±3℃, TB=85℃±2℃, t1=t2=30min, switch time≤3min& cycle time : 100 times, recovery time: 2h±0.5h.

4.2 Resistance to solder heat

Submerge the device terminals into the solder bath at 260□ ±5□ for 10±1 sec. Then release the device into the room conditions for 4 hours. It shall meet the specifications in 3.3.

4.3 Solder ability

Submerge the device terminals into the solder bath at 245□ ±5□ for 5s, More than 95% area of the soldering pad must be covered with new solder. It shall meet the specifications in 3.3

4.4 The Temperature Storage:

4.3.1 High Temperature Storage: The components shall remain within the electrical specifications after being kept at the 85℃±2℃for 96h±4h, recovery time : 2h±0.5h.

4.3.2 Low Temperature Storage: The components shall remain within the electrical specifications after being kept at the –40℃±3℃for 96h±4h, recovery time : 2h±0.5h.

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014

4.5 Humidity test:

The components shall remain within the electrical specifications after being kept at the condition of ambient temperature 60℃±2℃, and 90~96% RH for 96h±4h.

4.6 Mechanical shock

Drop the device randomly onto the concrete floor from the height of 1m for 3 times. The resonator shall fulfill the specifications in 3.3.

4.7 Vibration

Subject the device to the vibration for 2 hour each in X, Y and Z axes with the amplitude of 1.5 mm at 10 to 55 Hz. The resonator shall fulfill the specifications in 3.3.

5. Remarks

5.1 Static voltage:

Static voltage between signal load & ground may cause deterioration & destruction of the component. Please avoid static voltage.

5.2 Ultrasonic cleaning:

Ultrasonic vibration may cause deterioration & destruction of the component. Please avoid ultrasonic cleaning.

5.3 Soldering:

Only leads of component may be soldered. Please avoid soldering another part of component.

6. Packing

6.1 Dimensions

(1) Carrier Tape: Figure 1

(2) Reel: Figure 2

(3) The product shall be packed properly not to be damaged during transportation and storage.

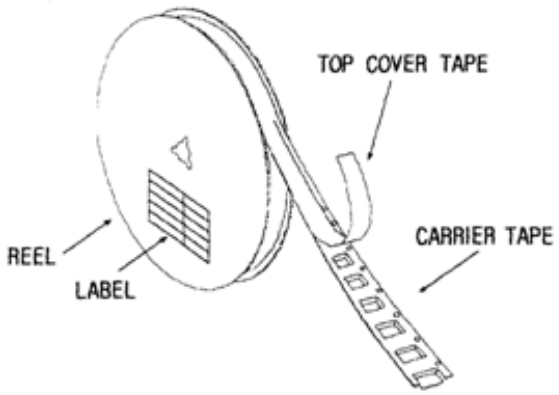
6.2 Reeling Quantity

1000 pcs/reel 7"

3000 pcs/reel 13"

6.3 Taping Structure

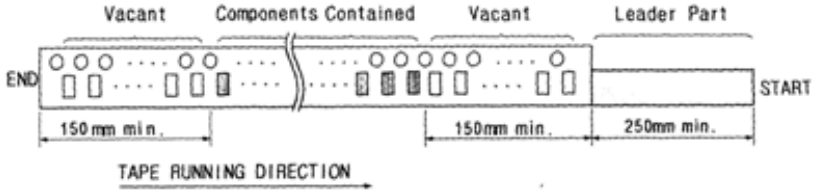
(1) The tape shall be wound around the reel in the direction shown below.



(2) Label

Device Name	
User Product Name	
Quantity	
Lot No.	

(3) Leader part and vacant position specifications.



7. Tape Specifications

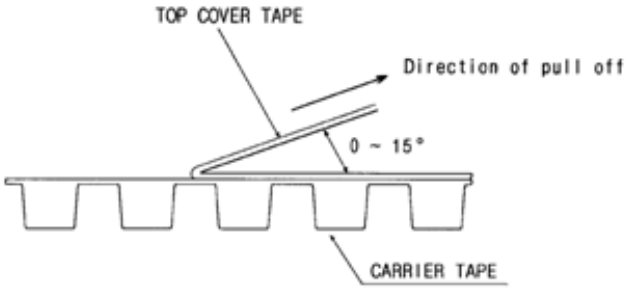
7.1 Tensile Strength of Carrier Tape: 4.4N/mm width

7.2 Top Cover Tape Adhesion (See the below figure)

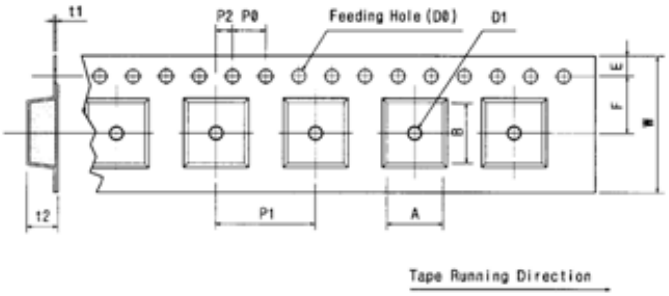
(1) pull off angle: 0~15°

(2) speed: 300mm/min.

(3) force: 20~70g



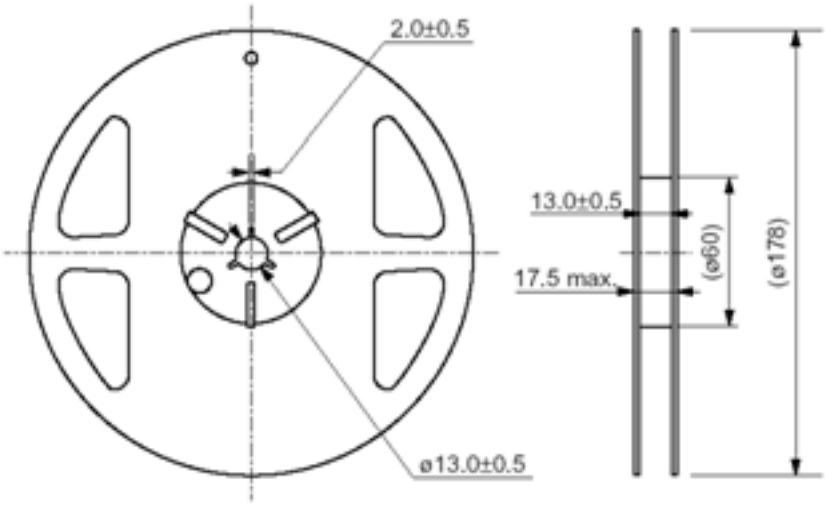
[Figure 1] Carrier Tape Dimensions



[Unit: mm]

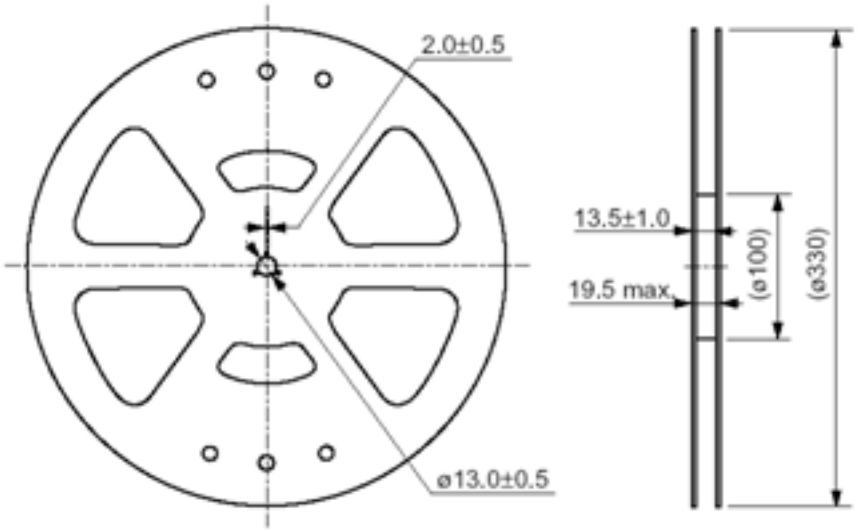
W	F	E	P0	P1	P2	D0	D1	t1	t2	A	B
12.0 ±0.3	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1	4.0 ±0.1	2.0 ±0.05	Ø1.5 ±0.1	Ø1.0 ±0.25	0.3 ±0.05	1.25 ±0.1	3.3 ±0.1	3.3 ±0.1

[Figure 2] Reel Dimensions



ø178 Reel Dimension

(in mm)



ø330 Reel Dimension

(in mm)

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Ordering Guidance

IC - Quartz

QS-Digits:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
QS- Eingabe/Enter:	I	C	1	3	0	3	2	,	7	6	8	M	1	2	,	5	A	B	1	B
Bezeichnung/Indic.:	Gruppe		Grösse		Frequ./FRQ/Fliesskomma							Hz	Load/CL/uF				Fto	Fst	OM	TR

IC Quartz | Size code | H/K/M/G | F.tol. at 25° in ppm | F.stab. In Operating Temp. Range | Oscillation Mode | oper. Temp. In °C

IC-Applications:

Portable instruments

Industrial products

Battery powered prod.

A	10	A	10
B	15	B	15
C	20	C	20
D	25	D	25
E	30	E	30
F	50	F	50
G	100	G	100
		H	-0,034
		I	-0,042

1	Fund
3	3rd OT
5	5th OT

A	0°C to + 70°C
B	-20°C to + 70°C
C	-10°C to + 60°C
D	-10°C to + 70°C
E	-40°C to + 85°C
F	-45°C to + 125°C

RED FREQUENCY

IO - Oszil.

QS-Digits:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
QS- Eingabe/Enter:	I	O	1	4	0	2	4	,	0	0	0	M	0	3	,	3	B	B
Bezeichnung/Indic.:	Gruppe		Grösse		Frequ./FRQ/Fliesskomma							Hz	Spannung/V				Fst	TR

IO Oszillators | Size code | H/K/M/G | Frequency Stability | oper. Temp. In °C

IO Applications:
WLAN
GPS
WIFI
Cell Phones
Digital TV

A	10
B	20
C	30
D	40
E	50
F	80
G	160
H	200
I	100

A	=	0°C to + 70°C
B	=	-20°C to + 70°C
C	=	-10°C to + 60°C
D	=	-10°C to + 70°C
E	=	-40°C to + 85°C
F	=	-45°C to + 125°C

IR - Reson.

QS-Digits:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
QS- Eingabe/Enter:	I	R	Z	T	T	C	C	0	0	2	,	0	0	0	M	G
Bezeichnung/Indic.:	Gruppe		Bezeichnung / Item Code					Frequency								

IR Resonator | Design Mode

IR Applications:
DAB
Cable Modem
Remote Control

Intertec Components GmbH
Erdinger Straße 45
85356 Freising/Germany

Tel: +49-8161-9913-0
Free-Call: 0800-9913-000
Fax: +49-8161-9913-20

service@intertec-components.de
www.intertec-components.de

Edition December 2014